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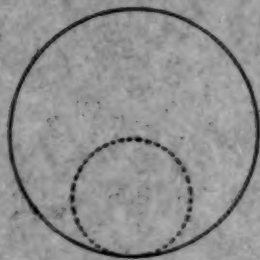
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## SCLEROSIS OF CENTRAL ARTERY OF RETINA.

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PHILADELPHIA, PA.

At two hundred consecutive necropsies in the Philadelphia General Hospital and Hospital of the University of Pennsylvania histologic examinations were made of the optic nerve, with especial reference to the normal or pathologic structure of the central artery of the retina. The results of these examinations are discussed and presented in the form of tables. The arteries were normal in 45 per cent; there was "excessive physiologic thickening" of the intima in 21 per cent, and arteriosclerosis in 26 per cent. The lesions found and described are illustrated in Plates 9 to 12. Thesis presented for the degree of Doctor of Medical Science, Graduate School of Medicine, University of Pennsylvania.

It is becoming a matter of common knowledge that arteriosclerosis is rarely a disease affecting the vascular system uniformly. On the contrary there is usually great variation in distribution as well as in kind of arterial lesions; and not infrequently the vessels of certain organs are involved exclusively, or to a much greater extent than are vessels in other regions. The major factors that determine this irregularity in distribution of arteriosclerosis are doubtlessly linked with the great variability of structure in different parts of the arterial tree, as well as with purely local disease processes that secondarily involve the vessels.

The present status of our knowledge of arteriosclerosis in general has been lately reviewed by MacCallum<sup>1</sup>. The literature of sclerosis of the central artery has been repeatedly summarized and may be found in the papers by Hertel<sup>2</sup>, Streiff<sup>3</sup>, Harms<sup>4</sup>, and in the splendid work on the pathology of the eye by Parsons<sup>5</sup>. A still more recent contribution to the subject is that of Baumgärtner<sup>7</sup>. It seems therefore unwarranted to add another review of the literature to those already existent.

It is evident that different writers have had a different concept of arteriosclerosis, and this fact alone accounts for differences in the interpretation of the results. In particular, the question of what constitutes a normal central artery appears to be a matter of opinion. The confusion is largely due to the normal variations in the structure of the intima, at different periods of life.

Most of the previous reports are based on relatively short series of cases. Such, however, are inadequate for a proper understanding of arteriosclerosis, for in some preliminary studies I found wide variation in the condition of both normal and diseased central arteries. For this reason, and in view of the exceptional facilities available at the Philadelphia General Hospital, it was thought that the whole question of sclerosis of the central artery could be put on a firmer basis by a careful study of a large series of consecutive cases.

### MATERIAL AND METHODS.

The specimens were obtained from 200 consecutive necropsies.\* Both optic nerves were severed at the eyeball and fixed for 24 hours in 10% formalin solution, embedded in celloidin, and sectioned at different levels, in order to study either or both the extraneural and intraneural parts of the arteries. The sections were routinely stained with hematoxylin and eosin, and by Weigert's method for demonstrating elastic fibrils. Mallory's phosphotungstic acid hematoxylin was also employed in the majority of the cases; in these instances the unstained celloidin sections were placed in Zenker's solution for several hours before staining.

In addition to the histologic part of this investigation the history and the postmortem protocol of the patients

\*Facilities for obtaining the optic nerves were kindly furnished by the pathologists of the Philadelphia General Hospital and the University Hospital. I wish to express my sincere appreciation of the many courtesies extended to me.



were studied, and data obtained on the age, sex and race of the diseased; the immediate and contributory causes of death, and the condition of the aorta, coronary arteries, the basal vessels of brain and the cortical arteries. In a fair number of cases one or more ophthalmologic examinations afforded an excellent opportunity to compare pathologic with clinical observations.

#### NORMAL STRUCTURE OF THE CENTRAL ARTERY OF THE RETINA.

The arteria centralis retinae arises from the ophthalmic artery, a branch of the internal carotid. It runs forward along the under surface of the optic nerve to a point about 15 mm. from the posterior surface of the eyeball, where it penetrates the substance of the nerve and continues its course forward in the center of that structure. The former portion is termed the extraneural, the latter the intraneural part. At the retina repeated division results in the formation of an arterial network, which does not anastomose with any of the other arteries supplied to the eyeball.

The artery, with its accompanying, vein enters the nerve at an oblique angle of about 70°-80°, carrying

with it a mantle of fibrous tissue derived from the pial sheath of the nerve. The exact site and angles of entrance are, however, not constant. On reaching the axis of the nerve the vessels turn almost at right angle, and pass forward enveloped by a core of connective tissue, the central fibrous strand. Both artery and vein give off one or several minute branches, which ramify in the septa of the nerve and its central strand. The double angulation of the vessel may be an important protective mechanism, elaborated to prevent sudden changes of intraarterial pressure in its intraneural part.

The diameter of the lumen of the artery varies considerably; Hertel<sup>1</sup> gives 210 $\mu$  for the proximal, and 170 $\mu$  for its distal portion; similar figures were obtained from the measurement of a number of vessels of this series.

In structure the central artery resembles that of the other small named vessels. The intimal surface is covered by a single layer of flat, inconspicuous endothelial cells. In infancy this layer rests directly upon the fairly prominent elastic coat, or "elastica." With advancing age, a very thin subendothelial layer of fibroelastic tissue develops. A great deal of attention has been

#### PLATE 9

Fig. 1. Shows the general appearance of the intraneural part of the central artery of the retina, and the accompanying veins. White woman, 47 years old; died from cerebral thrombosis. (Case 186, left; Hematoxylin-Eosin; x92).

Fig. 2. Shows general appearance of the central vessels of the retina and their small branches. The elastic fibers of the intima are very prominent in the arteries, but inconspicuous in the veins. White woman, 61 years old, died from cerebral hemorrhage. (Case 191; intraneural part, left; Weigert's elastic stain, x92).

Fig. 3. Shows the general appearance of the intraneural part of the central artery of the retina and the accompanying vein. The elastic tissue of the arterial intima is in excess. White woman, 47 years old; died from cerebral thrombosis. (Case 186, left; Weigert's elastic stain, x92).

Fig. 4. The subendothelial tissue of intima shows uniform fibrous thickening with much proliferation of the elastic fibers. White man, 65 years old; died from cerebral hemorrhage and general arteriosclerosis. (Case 57, extraneural part, left; the artery

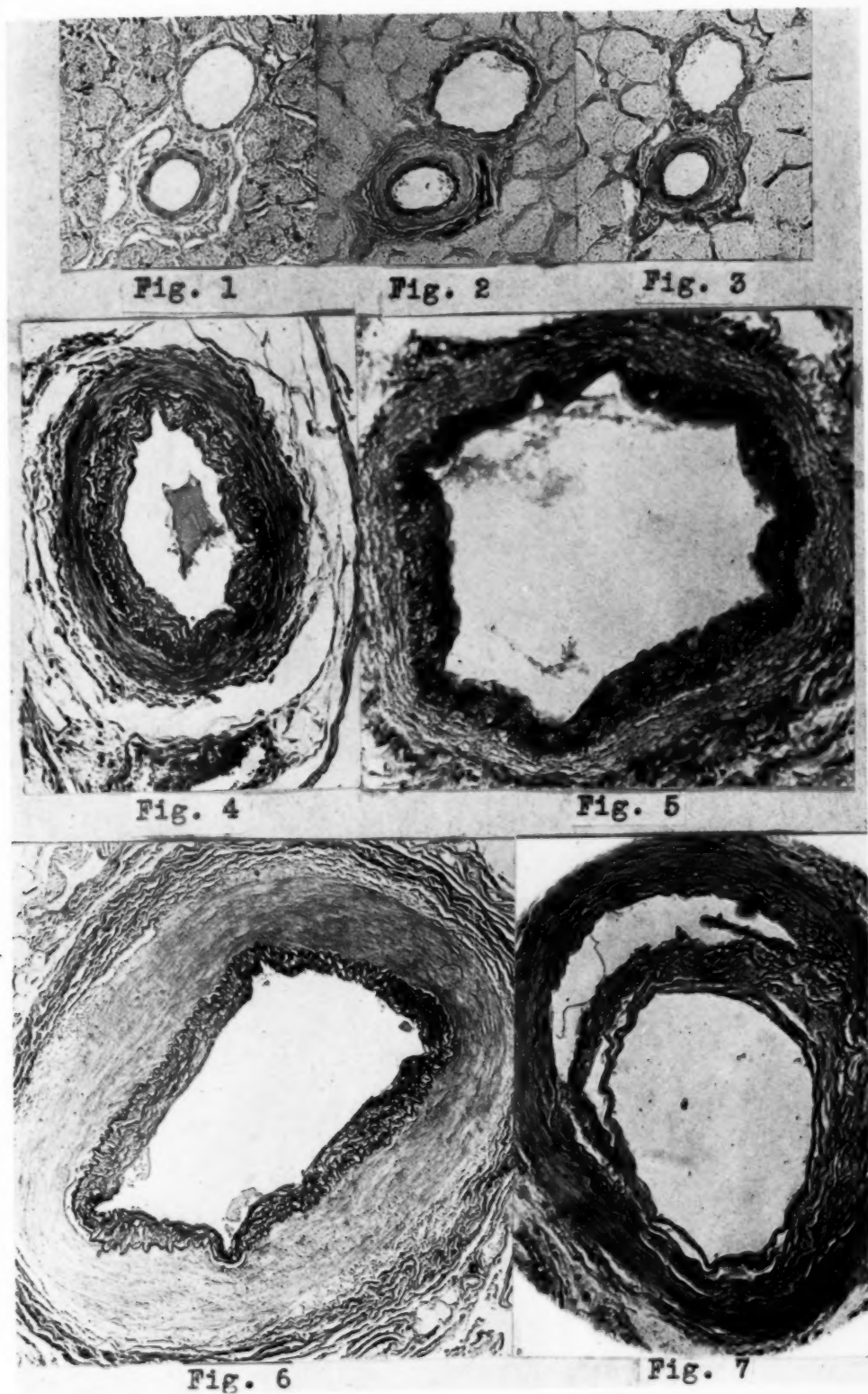
on right side was normal. Hematoxylin-Eosin; x184).

Fig. 5. The intima shows a fairly uniform fibrous thickening, and proliferation of delicate elastic fibrils; these are often fragmented. White man, 61 years old; died from cerebral arteriosclerosis with terminal bronchopneumonia. (Case 37, extraneural part, right; Weigert's elastic stain, x250).

Fig. 6. The intima is somewhat irregularly thickened; the elastic fibers are greatly in excess. In some of the deeper parts of the intima atheromatous patches have developed; here the elastic fibers are fragmented or entirely destroyed. White man, 56 years old; died from cerebral hemorrhage and malignant hypertension. (Case 93, extraneural part, left; Weigert's elastic stain; x69).

Fig. 7. The intima is somewhat irregularly thickened, causing a narrowing of the arterial lumen. The elastic fibers are very coarse and have undergone much proliferation. Black female, 75 years old; died from thrombotic paraplegia and general arteriosclerosis. (Case 42, extraneural part, right; Mallory's phosphotungstic acid hematoxylin; see also figures 19 and 21).





CENTRAL ARTERY OF RETINA. NORMAL STRUCTURE AND THICKENED INTIMA

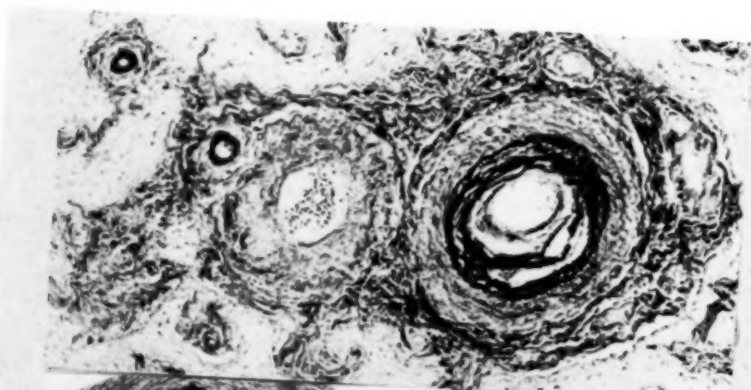


Fig. 8



Fig. 9



Fig. 10

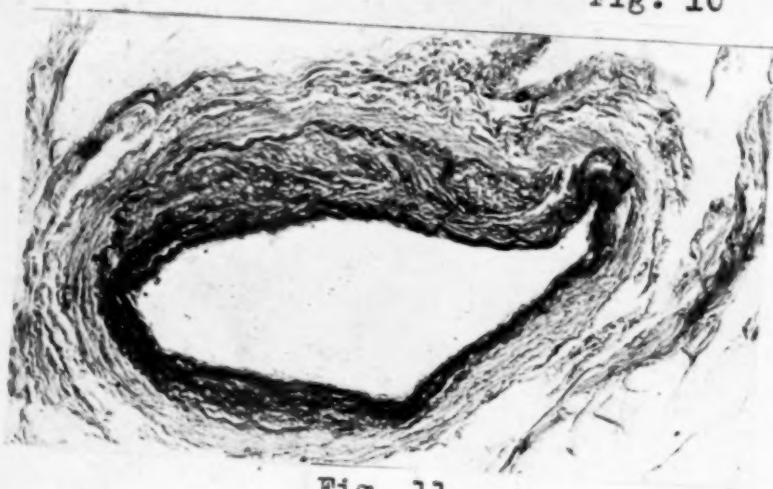


Fig. 11

CENTRAL ARTERY OF RETINA. THICKENING OF INTIMA FIBROSIS.

devoted by Jores<sup>3</sup> and others to the structure of the intima of arteries in general, and by Streiff<sup>4</sup>, Harms<sup>5</sup>, Hertel<sup>2</sup> and others to the intima of the retinal vessels. These writers have attempted to trace the gradual development of the subendothelial layer, and have differentiated between a "physiologic" thickening of the intima, and the "pathologic" thickening of arteriosclerotic lesions. As will be shown below, the boundary lines between the normal and the abnormal are extremely vague, and frequently one type merges imperceptibly into the other.

The media consists mainly of circularly arranged muscle fibers, the nuclei of which lie transversely to the axis of the vessel. Between the muscle cells extends a scanty elastic network; collagenous connective tissue is normally not present or at least inconspicuous. The junction of media and adventitia is not marked by an external "elastica." In the adventitia delicate elastic fibrils are mingled with coarser collagenous fibers, which support minute vessels (the vasa vasorum), and minute spaces, the adventitial lymphatics. The importance of the latter in the pathogenesis of certain forms of arteriosclerosis appears to be much underestimated. The adventitia fades into the surrounding perivascular stroma, the central fibrous core, which also supports the accompanying vein, and the small arterial and venous branches. (The general appearance of the intraneural parts of the central vessels are shown in figures 1, 2, 3, 27 and 28).

#### HISTOPATHOLOGY OF SCLEROSIS OF THE CENTRAL ARTERY.

The nomenclature of arterial disease is still in a formative stage, and different writers use different terms for the recognized forms of vascular sclerosis. In this investigation are discussed separately as well defined entities, syphilitic arteritis, thrombosis and periarteritis. The remaining arterial changes found are included under the general term of arteriosclerosis.

TABLE I.  
HISTOLOGIC APPEARANCE OF CENTRAL ARTERY OF THE RETINA

Condition of Artery	Number of Cases	Per cent
Normal .....	91	45.5
Excessive "Physiologic" Thickening of Intima.	43	21.5
Arteriosclerosis .....	52	26.0
Syphilitic Arteritis .....	3	1.5
Thrombosis .....	1	0.5
Periarteritis .....	10	5.0

In Table I is shown the relative frequency of the different forms of arterial diseases found in this series. It will be seen that in 91 cases (45.5 per cent) the vessels were normal; while in 109 patients (55.5 per cent) various lesions occurred. For the purposes of description and analysis, the several groups are discussed separately.

#### NORMAL ARTERIES AND ARTERIES WITH EXCESSIVE PHYSIOLOGIC THICKENING OF THE INTIMA.

Reference has been made above to the developmental changes occurring in

#### PLATE 10

Fig. 8. Thickening of the intima has produced a marked narrowing of the arterial lumen. The internal elastica is split; the elastic fibrils are greatly in excess. Note also the coarseness of the elastic fibrils of the two small arterial branches. In contrast the vein shows no proliferation of elastic elements. White woman, 84 years old; died of general arteriosclerosis, with hemiplegia. (Case 118; intraneural part, right; Weigert's stain. See also figures 1 and 15).

Fig. 9. Moderate fibrosis and thickening of subendothelial tissue of intima, splitting and proliferation of elastic fibers. White man, 50 years old; died from dementia para-

lytica. (Case 7, extraneural part, right; Hematoxylin-Eosin).

Fig. 10. The elastic fibers of the intima are very coarse, and have undergone much proliferation. The subendothelial connective tissue is irregularly thickened. White man, 83 years old; died from general arteriosclerosis and hemiplegia. (Case 85, extraneural part, left; Weigert's elastic stain, x184).

Fig. 11. The intima is irregularly thickened, fibrosed, and partly hyalinized. There is much splitting, fragmentation, and reduplication of the elastic fibers. White woman, 60 years old; died from right hemiplegia and melanotic sarcoma. (Case 6, extraneural part, right; Weigert's elastic stain, x184).



the intima, and it has been stated that with advancing age a subendothelial layer is interpolated between the endothelial lining and the internal elastic membrane. In the case of the central artery of the retina this "physiologic thickening" is quite inconspicuous, and requires the use of high magnification to observe. In the present series, patients below the age of 20 showed no definite subendothelial layer at all, nor was any proliferation of the elastic tissue observed; indeed, with the exception of the coarse single band of internal elastica, the elastic fibers of the remainder of the arterial wall were extremely delicate.

In the group of cases from the third and fourth decade it was usually, though not always, possible to find a very thin, almost homogeneous, subendothelial band, as well as a separation of the internal elastica into a double, and more rarely a triple, lamella. Between these closely approximated lamellae more delicate elastic fibrils were frequently found; and there was likewise an unmistakable, though slight, increase of the elastic tissue in the adventitia, as well as a coarsening of the collagenous fibrils of this coat. A clearly defined thickening of the media was not observed. In patients of more advanced age the changes were little if any more prominent; in fact, the process seemed to have reached a maximum about the fourth or fifth decade, and remained stationary unless true arteriosclerotic proliferations became superimposed. In brief, while it was usually quite possible to observe a difference in the intima of youthful and middle aged patients, it was rarely possible to note any difference between normal vessels of middle aged and elderly persons.

There was, however, a group of 43

cases (21.5 per cent of the entire series) where the subendothelial development seemed somewhat excessive. While this layer remained rather homogeneous and of uniform thickness, it appeared coarser, the internal elastica was split into two or more lamellae, no longer closely approximated, but distinctly separated. The elastic fibrils, other than those of the internal membrane, were fairly prominent in the intima as well as in the adventitia. But no degenerative changes of any kind were seen. It is a matter of opinion whether this condition should be regarded as normal, or as a mild form of sclerosis. For this reason, it seemed best to group together such arteries under the noncommittal term "excessive physiologic thickening of the intima."

#### ARTERIOSCLEROSIS PROPER.

In 52 cases, or 26.0 per cent of the series, one or both of the central arteries showed the typical picture of arteriosclerosis.

In every instance changes in the intima predominated over those in other coats. In the majority of the arteries the chief characteristics of the lesions were: fibrous proliferation of the subendothelial tissue; excessive overgrowth of the elastic fibrils, and various retrograde processes affecting one or both of these two structures.

The various kinds of changes encountered are illustrated in figures 4 to 18.

In figures 4 and 5 the intima shows a fairly uniform proliferation, consisting largely of dense collagenous fibrils intermingled with an abundance of both delicate and coarse elastic fibrils, which are partly connected with the internal elastic lamella. The character

#### PLATE 11

Fig. 12. Local fibrous and hyalin thickening of intima; atrophy of subjacent muscularis. White woman, 42 years old; died from apoplexy; had general arteriosclerosis. (Case 10; extraneural part, left; Mallory's phosphotungstic acid hematoxylin, x92).

Fig. 13. The intima is irregularly thickened and at one place protrudes as a hillock into the lumen. The internal elastica is

partly split and reduplicated. White woman, 62 years old; died from generalized arteriosclerosis. (Case 200, extraneural part, left; Weigert's elastic stain).

Fig. 14. Higher power photomicrograph of preceding figure. The intimal thickening is seen to be somewhat cellular. The reduplicated internal elastica feathers out in the thickened mass. (Case 200; Hematoxylin-Eosin).

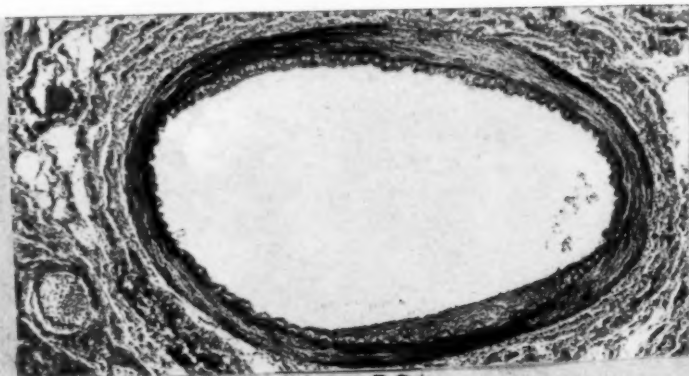


Fig. 12

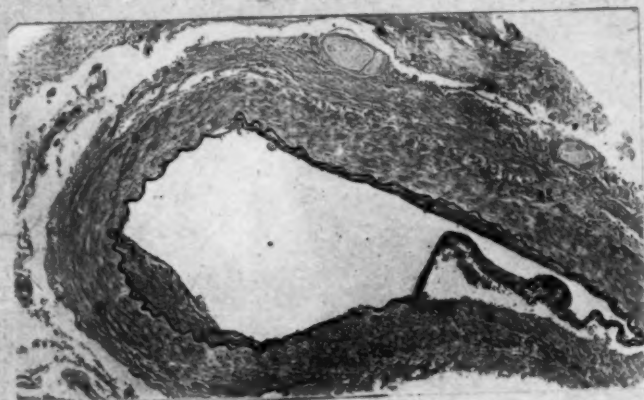


Fig. 13

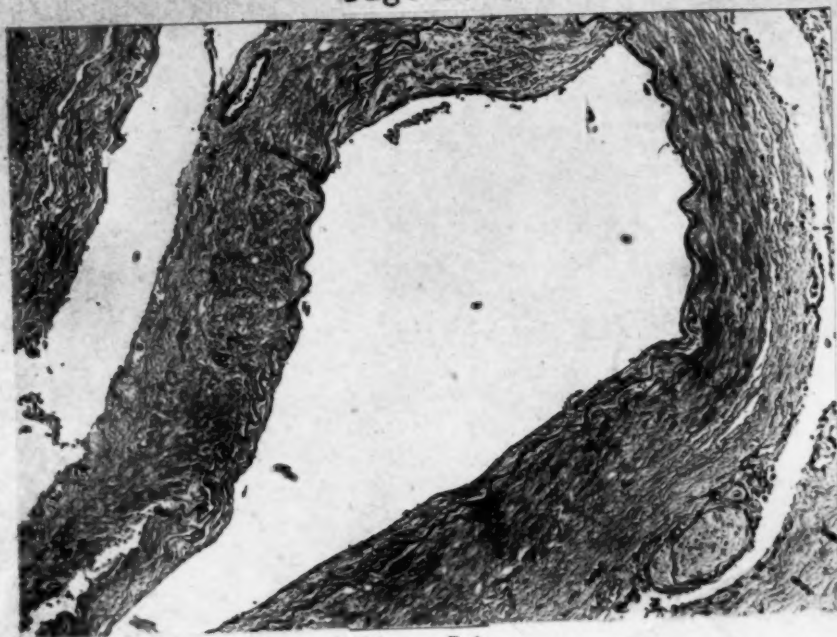


Fig. 14

THICKENING OF INTIMA AND ELASTIC TISSUE.

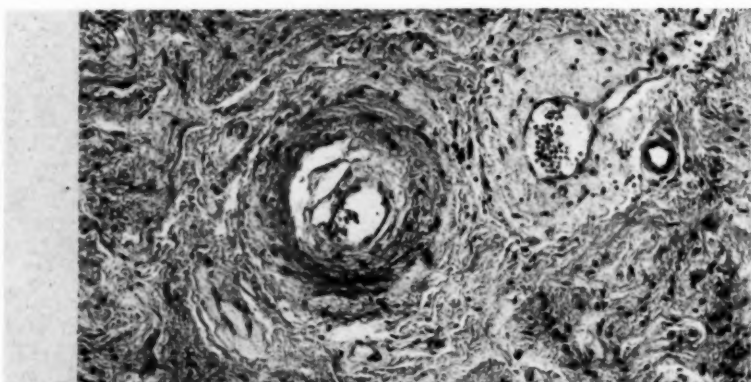


Fig. 15

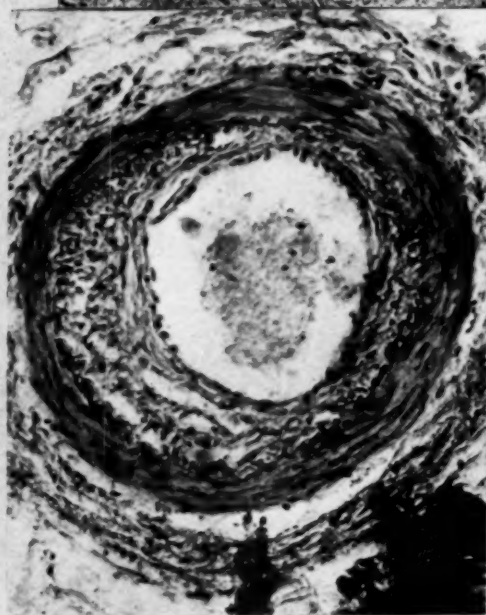


Fig. 16



Fig. 17



Fig. 18

LUMEN NARROWED INTIMA THICKENED, NECROTIC AND CALCIFIED



of these fibrils is better shown in figures 6 and 7; where it is seen that the elastic tissue forms a number of more or less concentric wavy rings, of varying thickness, within the coarse subendothelial layer. The elastic fibrils do not completely encircle the lumen, but in many places they become fragmented, feather out and disappear entirely. Where such interruption of continuity occurred the intima always showed retrogressive alteration, usually of atheromatous nature. The media presented no demonstrable excess of elastic tissue, but in the adventitia a very definite increase of these elements was found.

In figure 8 the intimal proliferation had brought about a marked narrowing of the arterial lumen, tending toward its final occlusion. Such obliterative forms of sclerosis were observed in three cases only.

In figures 9 to 12 are shown common types of sclerosis where the proliferation is somewhat more localized to one or the other portions of the intima, leaving a portion of this layer in a fairly normal state. Not infrequently there was found atrophy of the muscularis adjoining the thickened intima (figure 12).

In the forms of sclerosis illustrated above, the intima was quite dense and noncellular, and frequently more or less hyalinized or atheromatous. In some vessels, however, an earlier stage of the process was encountered (figures 13 and 14). In the protruding hillock spindle shaped and round nuclei were scattered among the collagenous fibers, and there was little evidence of

overgrowth of the elastic tissue. That the nuclei were of fibroblastic, rather than endothelial, origin seemed evident from the lack of proliferation in the normal endothelial lining. Transitional stages between such cellular thickening of the intima and the further advanced fibrous overgrowth were often found.

The most frequent form of degeneration consisted in hyalinization of the collagenous tissue, but in the deeper portions of the intima, atheromatous breakdown was often found. The affected portions had a loose, structureless, granular appearance (figures 15 and 16). The elastic fibrils, including the internal elastic lamellae, were fragmented or completely destroyed, in such areas.

In addition to atheroma, calcareous deposition was found in 2 instances (figures 17 and 18); the lime salts formed irregular patches in the depth of the intima, and around the internal elastica. In brief, the sclerotic lesions of the central artery of the retina were quite similar to those found in vessels of like caliber, and need not be detailed any further. However, the degree of sclerosis seemed rather less striking than was often encountered in arteries from a different locality.

**THROMBOSIS.** The central artery of the retina, having no anastomotic connections, belongs to the so-called terminal or end arteries. Its occlusion will inevitably result in serious damage or death of the structures supplied by it. Occlusion may be brought about very suddenly by embolism, or more gradually by thrombosis. In one pa-

#### PLATE 12

Fig. 15. The lumen of the artery is markedly narrowed because of extensive thickening of its intima. The deeper portions of the intima are atheromatous. The media shows no change; the adventitia and the supporting perivascular tissue have undergone fibrous proliferation. The coats of the accompanying vein are thickened and partly hyalinized. The optic nerve is atrophic; its trabeculae are very prominent. White woman, 84 years old; died from general arteriosclerosis and hemiplegia. (Case 118; intraneural part, right; Hematoxylin-Eosin, x184).

Fig. 16. The microphotograph shows the extraneural part of the artery illustrated in

figures 10 and 18. The intima is greatly thickened, and its deeper portions are atheromatous; Hematoxylin-Eosin, x230.

Fig. 17. The deeper portions of the irregularly thickened intima are necrotic and calcified; the calcification involves the internal elastica. White man, 76 years old; died from cerebral arteriosclerosis and bronchopneumonia. (Case 26, extraneural part, left; Hematoxylin-Eosin, x138).

Fig. 18. The intima is irregularly thickened; its deeper portions are atheromatous and heavily encrusted with calcium salts. White woman, 62 years old; died from general arteriosclerosis. (Case 200, extraneural part, left; Hematoxylin-Eosin, x92).

tient, the left central artery contained a large organized thrombus, consisting of a dense, partly hyalinized, collagenous fibrous mass, into which extended an abundance of elastic fibrils (figures 19, 20 and 21). Recanalization had taken place in several places, and the newly formed channels were relined with a layer of endothelium. Sections from different levels of the vessel showed slight differences in the structure of the thrombus, which was more cellular in some regions and more fibrous elsewhere. The right central artery was markedly sclerosed, but had a free lumen. It is difficult to decide whether we are dealing in this case with an organized thrombus, or with obliterating proliferation of the intima such as occurs in so-called thromboarteritis. The end result is identical. The patient was a 75 year old negress, who died from thrombotic paraplegia and general arteriosclerosis. She had no acute endocarditis or other lesions which may give rise to emboli. Since arteriosclerosis alone frequently leads to thrombosis and since the right central artery, while markedly sclerotic, showed no obliterative proliferation of its intima, it seems most probable that the lesion was an ancient thrombus, resulting from arteriosclerotic disease.

**SYPHILIS.** Typical luetic arteritis occurred in 3 patients (figures 22 and

23). The adventitial coats were densely infiltrated with small round cells, and more oval endothelial elements. A similar, tho less marked, infiltration was present in the media; the intima showed an irregular thickening, produced in part by multiplication of its endothelial lining. In none of the three cases were necrotic foci found in the arterial walls. The pial coat of the optic nerves contained many lymphocytes and endothelial cells. Luetic changes were found in other organs.

**PERIARTERITIS.** Two forms of periarteritis occur in human pathology: The rare nodose type, definitely of infectious origin, accompanied by fever and systemic symptoms, and characterized by well defined histologic changes; and a less well recognized form, of unknown etiology and leading to periarterial fibrosis. In common with small arteries of other regions, the central artery of the retina is not infrequently the seat of the latter type of inflammatory reaction in its adventitial sheath, and in the periarterial stroma. Such periarteritis occurred in 10 cases summarized in Table II. Very little is known regarding its causation, but the cellular reaction characterizing the disease makes its inflammatory nature very probable. It must be remembered that all vessels are plentifully supplied with lymph channels, which in the

#### PLATE 13

Fig. 19. The artery is occupied by an ancient organized thrombus, which has been recanalized in several places. The elastic fibers are very prominent. Note the proliferation of the elastic fibers in the small arterial branch in the supporting stroma of the principal vessel. Black female, 75 years old; died from thrombotic paraplegia, and general arteriosclerosis. (Case 42; extraneural part, left; Hematoxylin-Eosin).

Fig. 20. Shows organized and partly recanalized thrombus in central artery of retina. The arterial lumen is reduced to a small channel—lined with endothelium. The organized thrombus consists of partly hyalinized fibrous tissue. Black female, 75 years old; died from thrombotic paraplegia and general arteriosclerosis. (Case 42; extraneural part, left; Mallory's phosphotungstic acid hematoxylin).

Fig. 21. Shows a higher power microphotograph of another portion of the artery shown in figures 22 and 23. Note the dense fibrillar character of the organized throm-

bus. The dark particles near the internal elastica are hemosiderin granules. (Case 42; extraneural part, left; Mallory's phosphotungstic acid hematoxylin).

Fig. 22. Syphilitic arteritis. The adventitia and the perivascular connective tissue are the seat of dense infiltration, with lymphocytes and endothelial cells. There is a slight proliferation of the intimal endothelium. White man, 60 years old; died from cerebral thrombosis with hemiplegia. Spinal Wassermann was strongly positive. The perineurium was densely infiltrated with small round cells; the optic nerves were atrophic. (Case 88, extraneural part, left; Hematoxylin-Eosin, 138).

Fig. 23. Syphilitic arteritis. Both the intima and the adventitia are thickened and contain many small round and oval cells. White man, 29 years old; died from cerebral hemorrhage and chronic nephritis. (Case 50; extraneural part, right; Hematoxylin-Eosin, x230).



Fig. 19

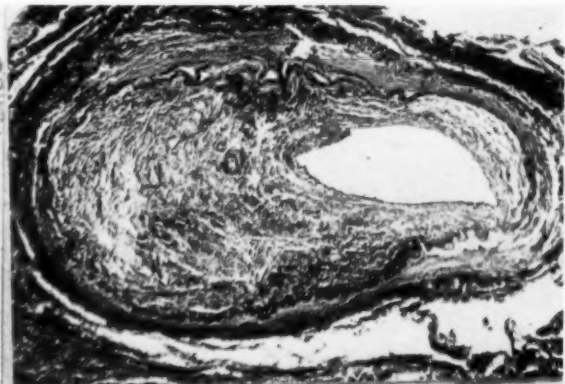


Fig. 20

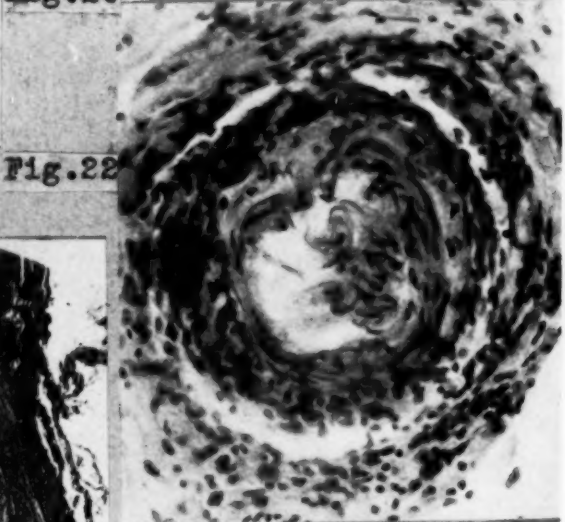


Fig. 22



Fig. 21

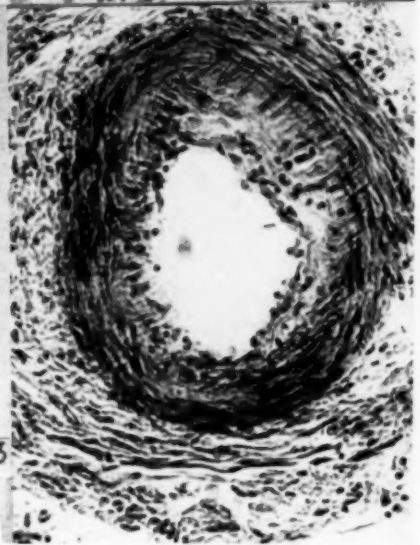


Fig. 23

OLD. ORGANIZED THROMBUS    SYPHILITIC ARTERITIS



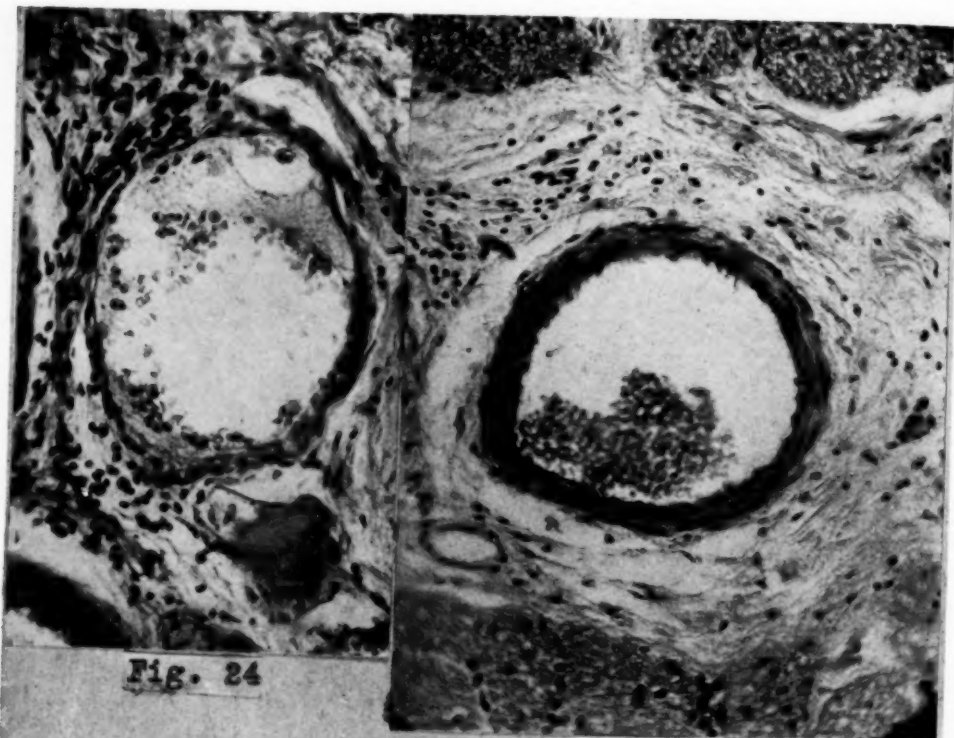


Fig. 24

Fig. 25

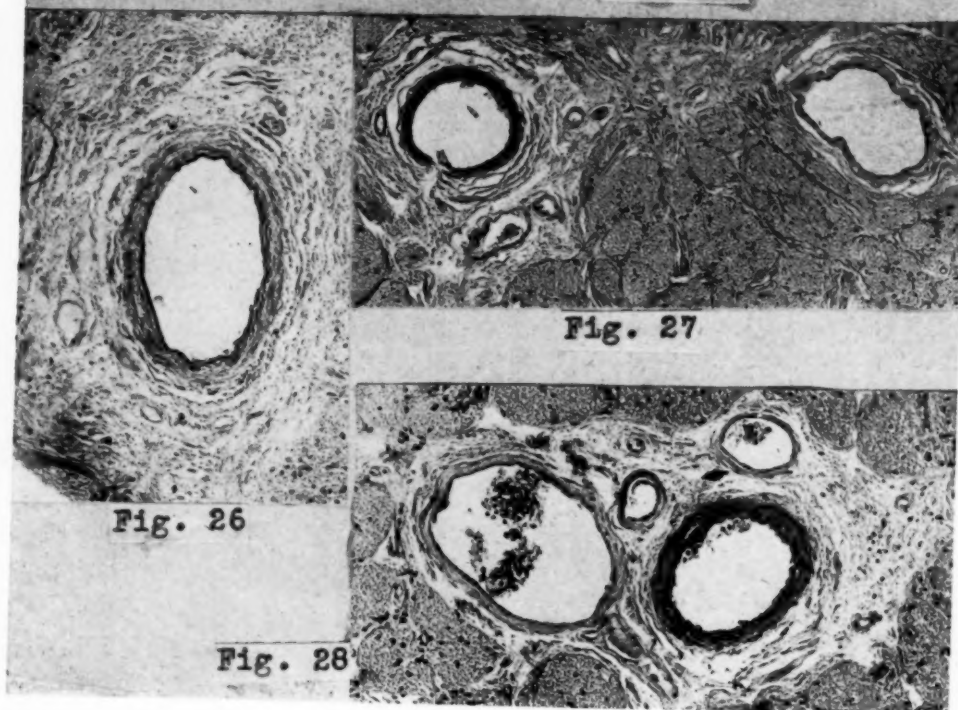


Fig. 26

Fig. 27

Fig. 28

main, run in the adventitial coat and the perivascular stroma. Now it is an accepted fact that bacteria and foreign particles in general are commonly conveyed by way of the lymphatic channels; and it seems very likely that in such manner periarterial reactions may arise.

Analysis of the data presented in the table shows that this form of periarteritis occurred most frequently in white

men, and that it was not confined to any particular age. In three patients lues was the principal disease; in three, a generalized arteriosclerosis; in two, cerebral thrombosis; in one, ulcerating cancer of the orbit; and in one, chronic endocarditis. In the last case the infiltrating cells were mainly polymorphonuclear leucocytes, while in the other nine, lymphocytes predominated. In three cases periarterial fibrosis oc-

TABLE II.

Race	Sex	Age	General Disease	Condition of Nerve	Condition of Artery
White	Female	56	Cerebrospinal lues	Small round cell infiltration; thickening of pia and of trabeculae	Adventitial small round cell infiltration; moderate thickening of intima.
White	Male	74	General arteriosclerosis	Normal	Chronic periarterial fibrosis; moderate intimal thickening.
White	Female	71	General arteriosclerosis	Normal	Chronic periarterial fibrosis; slight thickening of intima.
White	Male	76	General arteriosclerosis	Fibrous thickening of pia and of trabeculae	Chronic periarterial fibrosis; slight thickening of intima.
Negro	Male	36	Carcinoma of orbit	Normal	Marked adventitial small round cell infiltration; intima is normal.
Negro	Male	48	Chronic endocarditis	Subdural space is infiltrated with polymorphonuclear leucocytes	Periarterial tissue and adventitia are seat of leucocytic infiltration; slight intimal thickening.
White	Male	47	Cerebral thrombosis	Normal	Moderate degree of small round cell infiltration in adventitia; intima is normal.
Negro	Male	37	Lues	Normal	Slight adventitial small round cell infiltration; intima slightly thickened.
White	Male	42	Cerebrospinal lues	Normal	Moderate degree of small round cell infiltration in adventitia and perivascular stroma; intima is normal.
White	Male	61	Cerebral thrombosis; hemiplegia	Normal	Moderate degree of lymphocytic infiltration in adventitia; intima is slightly thickened.

PLATE 14

Fig. 24. Perivascular small round cell infiltration, especially around vein; vessels otherwise normal. White male, 42 years old; died from cerebral thrombosis and cerebrospinal lues. (Case 155, intraneural part, left; Hematoxylin-Eosin, x250).

Fig. 25. The perivascular stroma contains a moderate number of small round cells; retinal vessels otherwise normal. White male, 47 years old; died from cerebral thrombosis. (Case 121, intraneural part, left; Hematoxylin-Eosin, x230).

Fig. 26. Proliferation of perivascular connective tissue. The pia, arachnoid and the fibrous septa of optic nerve were likewise thickened. White man, 76 years old;

died from septic meningitis and general arteriosclerosis. (Case 59, intraneural part, right; Hematoxylin-Eosin).

Fig. 27. The central artery of the retina and its vein. Note the somewhat hyperplastic enveloping connective tissue strand. White man, 74 years old; died from lobar pneumonia. (Case 9; intraneural part, left; Hematoxylin-Eosin; x92).

Fig. 28. Shows the relation of central artery and vein. Small branches of both artery and vein are embedded in the perivascular supporting stroma which has undergone proliferation. White woman, 71 years old; died from generalized arteriosclerosis with hemiplegia. (Case 52; intraneural part, left; Hematoxylin-Eosin, x92).

curred without cellular reaction; this may be looked upon as representing the terminal stage of the process. The intima was normal in three cases, and more or less sclerotic in the rest. It seems striking that five of the ten patients suffered with a definite infection (lues, endocarditis, and ulcerating carcinoma of orbit).

The perivascular changes usually affected the retinal veins even to a greater extent than the arteries. Figures 25 and 26 show the cellular stage, figures 26 to 28 the fibrotic stage of the process.

#### IRREGULAR DISTRIBUTION OF ARTERIOSCLEROSIS.

That vascular sclerosis usually does not involve the arterial system uniformly is brought out by comparing the state of the vessels of different localities, or different portions of any particular artery. The vessels selected for comparison with the central artery of the retina were the aorta and the coronary artery, the basal vessels of

the brain, and the cortical arteries. In addition the central artery of one side was contrasted with its fellow of the opposite side, and finally, the extraneural portion of the central artery with its intraneural part. In the case of the aorta, the coronaries, and the basal vessels the diagnosis of sclerosis was made by gross inspection; doubtless microscopic examination would have raised the incidence. The condition of the cortical arteries were determined by histologic examination.

The results obtained are summarized in Table III. The table shows that in approximately the same percentage of cases, sclerosis occurred in the aorta, coronary or brain arteries; but that in only 30 per cent of the cases the central arteries were likewise involved. Conversely, in about 18 per cent of patients with grossly normal aorta, coronary or cerebral vessels, sclerosis of the central arteries was found.

The fact that sclerosis of the retinal vessels is sometimes unilateral is

TABLE III.  
INCIDENCE OF SCLEROSIS OF AORTA AND CORONARY AND CEREBRAL VESSELS; CONTRASTED WITH CONDITION OF CENTRAL ARTERY OF RETINA.

	Total No. of cases in group.	Central Artery Normal.	"Excessive" physiologic thickening of intima of central artery.	Sclerosis of Central Artery.
Sclerosis of Aorta or Coronary.	15.2	70 (46.0)	36 (23.7)	46 (30.3)
Aorta and Coronary Normal.	34	21 (61.8)	7 (20.6)	6 (17.6)
Sclerosis of Cerebral Arteries.	148	65 (43.9)	38 (25.7)	45 (30.4)
Cerebral Arteries Normal.	38	26 (68.4)	5 (13.2)	7 (18.4)

The figures in parenthesis give the incidence in per cent of the total number of cases in each group.

TABLE IV.  
COMPARISON OF EXTRAMURAL AND INTRAMURAL PARTS OF THE CENTRAL ARTERY OF THE RETINA.

	Total Number of Cases.	Normal.	Excessive Hyperplasia of Intima.	Arteriosclerosis.
Extramural Part ...	51	16 (31.4)	12 (23.5)	23 (45.1)
Intramural Part ....	135	75 (55.6)	31 (23.0)	29 (21.4)

The figures in parenthesis give the incidence in per cent of the total number of cases in each group.



shown by the following instances: In 12 cases one central artery was sclerosed, while its fellow was normal. In 9 cases the artery of one side showed excessive physiologic thickening, while the other had a normal intima. In one case perivascular sclerosis occurred unilaterally. In the entire series of 200 cases, there were then 22 instances where the vessel of one side only showed disease changes. The factors responsible for this uneven distribution could not be determined, but the fact itself is of some practical importance.

Comparison of the extraneural and intraneural parts of the central artery showed that while excessive "physiologic" thickening was present in an approximately equal per cent of cases (23 per cent), the incidence of sclerosis differed considerably. Indeed sclerotic lesions occurred a little over twice as frequently in the extraneural as in the intraneural part (45.1 per cent against 21.4 per cent). The data are summarized in Table IV.

The mechanics of the retinal circulation seem to afford an explanation of this discrepancy. It will be remembered that the central artery enters the nerve at a somewhat obtuse angle, and upon reaching the central part of the nerve, curves forward at a right angle. This double angulation will prevent any sudden changes of intravascular pressure, and thus any sudden strain. There are many arguments for believing that arteriosclerosis is, at least in

part, of mechanical origin; and that abrupt changes in intravascular pressure bring about minute tears in the more delicate structures of the intima. If such a theory is correct, then an important protective mechanism has been elaborated in the central artery, guarding the retinal circulation.

#### COMPARISON OF OPHTHALMOLOGIC AND HISTOPATHOLOGIC EXAMINATIONS.

In 27 cases the previous records contained detailed information regarding the condition of the central vessels of the retina. In 17 the visible retinal arteries were regarded as normal. However, on histologic examination of the central artery only 7 were found to be normal; 5 definitely sclerotic; 4 presented an excessive physiologic thickening of the intima, and 1 perivascular small round cell infiltration. Of the 10 cases regarded as sclerotic on ophthalmologic examination, 4 were also found sclerosed on histologic study, 3 showed excessive "physiologic" thickening of the intima, 2 periarteritis and 1 was normal. There is then considerable discrepancy between clinical and histologic findings. This is of particular importance since the ophthalmologic examinations were made by competent specialists. It must be remembered, however, that the ophthalmoscope brings into view only delicate terminals of the central artery, removed a considerable distance from the portion of the vessel examined histologically. The discrepancy between clinical and histologic examina-

TABLE V.  
INCIDENCE OF SCLEROSIS OF THE CENTRAL ARTERY AT DIFFERENT AGE PERIODS.

Age in Years.	Total Number of Cases.	Normal.	Excessive hyperplasia of intima.	Sclerosis.
Under 10	3	3 (100.0)	.....	.....
10-19	5	3 (60.0)	.....	2 (40.0)
20-29	9	6 (66.6)	2 (22.2)	1 (11.2)
30-39	19	11 (57.9)	1 (5.3)	7 (36.8)
40-49	37	21 (56.8)	9 (24.3)	7 (18.9)
50-59	35	16 (45.7)	13 (37.1)	6 (17.2)
60-69	51	21 (41.2)	14 (27.4)	16 (31.4)
70-79	18	7 (38.9)	4 (22.2)	7 (38.9)
Over 80	9	3 (33.3)	0	6 (66.6)
Total	186	91	43	52

The figures in parenthesis give the incidence in per cent of the total number of cases in each group.

tion is another illustration of the irregularity in distribution of arterial lesions.

#### ETIOLOGIC FACTORS IN ARTERIO-SCLEROSIS.

**CONSTITUTIONAL DISEASE:** In the hope of throwing some light on the factors that may be responsible for, or predispose to arteriosclerosis, the clinical and postmortem records of the cases were analyzed with respect to the incidence of age, sex, race and constitutional disease. In regard to the latter it was found, that with advancing age many of the patients suffered from such a variety of diseases, that no conclusions could be drawn concerning the importance of any one.

However, in the group of younger patients a few diseases recurred with sufficient frequency to merit brief discussion.

In 15 patients between the ages of 19 and 42 years, sclerosis of the central arteries was encountered. 12 of these were white persons, 3 negroes; 9 were men and 6 women. 7 of them suffered from undoubted luetic disease, paresis, tabes, cerebrospinal lues, luetic meso-ortitis, and 5 more died from apoplexy or cerebral thrombosis, conditions which in younger persons are often the result of luetic infection. The remaining three cases died from acute or chronic infections. In all of the patients, then, the principal disease was of an infectious nature, and in the majority, syphilis. The arterial lesions in this group were of the ordinary sclerotic type, and of rather slight degree.

**AGE.** Arteriosclerosis is generally regarded as disease of late middle life, and of old age. Indeed so constantly are sclerotic changes found in the larger vessels of elderly persons that the process seems almost a normal one, and quite comparable with senile change in other tissues. The incidence of age is analyzed in Table V. In the first column are recorded the total number of cases with normal arteries, with arteries showing excessive "physiologic" thickening of the intima, and with arteriosclerosis. The table shows that, at all age periods (excepting the group over 80 years old) the number of cases with normal arteries predominated over those with sclerotic retinal vessels. As could be expected the percentage of normal arteries varied inversely with age.

Excessive "physiologic" thickening of the intima occurred somewhat less frequently than did true arteriosclerosis, but it may well be that in many instances a sclerotic process was superadded to an already existent "physiologic" thickening. No great variation in the percentage of patients showing this condition was found in the different age groups after the third decade.

True arteriosclerosis occurred rather frequently in younger persons; and while the total number of patients with sclerosis of the retinal vessels below the age of 40 was not great, yet the percentage was somewhat high (i.e. 40 per cent in the second decade, 11 in the third, and 36 per cent in the fourth decade). From 40 years onward, there

TABLE VI.  
CONDITIONS OF THE CENTRAL ARTERY OF THE RETINA IN RELATION TO SEX AND RACE.

	Total Number.	Normal.	Excessive "physiologic" thickening of intima.	Arteriosclerosis.
Males .....	118	57 (48.3)	31 (26.3)	30 (25.4)
Females .....	68	34 (50.0)	12 (17.6)	22 (32.4)
Whites .....	147	66 (44.9)	38 (25.8)	43 (29.3)
Negroes .....	39	25 (64.1)	5 (12.8)	9 (23.1)
White Males .....	97	42 (43.3)	29 (29.9)	26 (26.8)
White Females .....	50	24 (48.0)	9 (18.0)	17 (34.0)
Negro Males .....	21	15 (71.4)	2 (9.5)	4 (19.0)
Negro Females .....	28	20 (71.0)	3 (10.7)	5 (17.8)

The figures in parenthesis give the incidence in per cent of the total number of cases in each group.

was a fairly steady increase in the percentage of sclerosis.

**SEX AND RACE.** The incidence of sex and race has been detailed in Table VI. In order to reduce the figures to a common basis, they are given in per cent of the total number of cases in any particular group. Comparing the condition of the central vessels in males and females, regardless of race, it was found that in women the incidence of sclerosis was somewhat higher, while if excessive physiologic thickening is regarded as a form of sclerosis, no differences appear in the sexes.

Since there are nearly four times as many whites as negroes in the series, a valid statistical comparison is scarcely possible. However, the incidence of sclerosis appears to be slightly lower among negroes. A contrast of white males and white females discloses that sclerosis of the central arteries is a little more frequent in the later group; but no difference in frequency was found to occur between negro males and negro females. While much caution must be exercised in the interpretation of statistical data based on relatively small numbers of cases, the conclusion seems warranted that sclerosis was somewhat more frequently encountered in females than in males, and in whites than in negroes. No satisfactory explanation can be offered at the time for the facts presented.

#### SUMMARY.

1. Histologic examination of the central arteries of the retina, obtained postmortem, from 200 patients disclosed normal vessels in 45.5 per cent, excessive physiologic thickening in 21.5, arteriosclerosis proper in 26.0,

syphilitic arteritis in 1.5, thrombosis in 0.5, and periarteritis in 5.0 per cent. The development of the subendothelial layer of the central artery normally reached a maximum about the fourth or fifth decade; excessive thickening, not accompanied by degenerative changes was found in about one-fifth of the arteries. The true arteriosclerotic lesions were similar to those occurring in other vessels of like caliber, but usually of a slight degree. The periarterial lesions were most frequently found in relation to local or general infection.

2. Sclerosis of the central arteries occurred only one-third as frequently as did sclerosis of the aorta, the coronaries and the brain arteries. Conversely, when the aorta, coronaries and brain arteries were grossly normal, sclerosis of the central arteries was found in 18 per cent of the cases. In 22 cases histopathologic differences were found between the right and left central arteries. Sclerotic changes occurred a little over twice as frequently in the extraneural as in the intraneural part of the vessels. Considerable disagreement was found to exist between clinical and histologic observations. The fact that vascular sclerosis usually does not involve the arterial system uniformly deserves emphasis.

3. In retinal arteriosclerosis of persons between the ages of 19 and 42 years of age, syphilis was the most frequent constitutional disease. In all age groups, the number of cases with normal predominated over those with sclerosed central arteries. The incidence of sclerosis was somewhat higher in females than in males.  
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## OSTEOSARCOMA OF THE ORBIT, WITH UNUSUAL SURGICAL COMPLICATIONS.

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Four years after injury to that region left exophthalmos was noted, and slowly increased. A bony tumor was found behind the eyeball encircling the optic nerve, classified as ossifying spindle cell sarcoma. There has been no recurrence. Originally reported to the Section on Ophthalmology of the College of Physicians of Philadelphia, April, 1925.

On April 23d, 1924, there was referred to me by Dr. H. H. Greenberg, M. S., aged 16, with a history that when 5 years old the left eye was injured by falling upon a sharp stone. The only noticeable sequel to this accident was a prominence of the temporal vein, exaggerated when he laughed. In his 8th year an operation was undertaken for the removal of tonsils and adenoids but was not completed because of severe hemorrhage. Six years later, or four years ago, the left eye began to protrude. This was slow and gradual until two months ago; since then the protrusion has increased rapidly. About six months ago X-ray treatments were given by Dr. Schwab of Lancaster. He has no pain, headache, nor subjective bruit, but has diplopia at times. Had measles, mumps, and chicken-pox.

Now, R. E. 5/5. L. E., L. P. L. E. Ptosis so extreme that care must be taken in the examination lest the stretched lids slip behind the globe. The veins of the conjunctiva are engorged, especially in the protruding inferior retrotarsal fold. There is firm resistance to replacement of the globe. A palpable mass is present in the region of the lacrimal gland and within the inferior orbital margin. Rotation of the globe is moderately restricted, especially downward. No bruit or thrill. Iris reacts to direct and consensual light stimulation.

Ophthalmoscopic examination: R. E. Normal. L. E. Papillitis. Elevation 3 D.

Physical examination was negative. Spinal fluid and blood Wassermann were negative.

X-ray report. From Laboratory of the Medico-Chirurgical Hospital of the U. of Pa: Frontal, sphenoid, and maxillary sinuses clear. Ethmoid cells, particularly the left side, opaque, probably due to tumor tissue. Nasal septum deflected to left. There is no evi-

dence of bone absorption or definite bone disease at this date. The enlarged eyeball casts a definite shadow as compared with the normal right eye. Whether this might be due to the increased size of the eyeball or some possible calcareous changes cannot be determined definitely. The same condition has been observed in an instance when the eyeball has been increased approximately 100 per cent, due clinically to retrobulbar sarcoma. A study of the densities of both orbits showing the relative increased circumscribed density on the left side is very interesting. Dr. Pfahler advised a series of X-ray treatments followed by enucleation and radium in the orbit. This was done.

After three elopements from the hospital he was finally brought to the operating table on May 15th, 1924, when with the assistance of Dr. P. N. K. Schwenk the tumor was removed. It was evident that the main growth was retrobulbar but because of the mass between the globe and the floor of the orbit it was decided to make an exploratory incision along the inferior orbital rim. Thru this opening a hard mass was felt immediately below the optic nerve. Because of this it was thought impossible to save the globe, and it, together with the soft tissues, was removed. During the dissection a dumb-bell shaped bony growth could be felt encircling the optic nerve. The larger globular mass was lodged between the dorsal surface of the optic nerve and the roof of the orbit, the lower was between the ventral surface of the optic nerve and the floor of the orbit. The mass was larger in diameter than the external opening of the orbit, in growing having pushed the roof of the orbit upward and the floor downward. It was crushed and pried out. Severe hemorrhage from the ophthalmic arteries was controlled by cautery.



The report of the pathologic examination made by Dr. Eugene A. Case was as follows: The specimen when received at the laboratory consisted of an eye and pieces of tissue of firm consistency containing numerous particles of bone. The pieces containing bone, which included all of the tissue except the eye, had to be decalcified before they could be prepared for study. This resulted in the loss of some of the usual sharp definition.

The picture is a composite one with no characteristic arrangement of the various parts, making it difficult to describe clearly. Trabeculae of bone are scattered thru the tissue. Some are older than others, having a more compact structure and fatty marrow in the spaces. Others are younger; and in several sections areas of cartilage, or rather a cartilaginous phase of ossification, shade off into the surrounding bone and fibrous tissue. The soft tissue differs in density and character in various situations. Some of this tissue is dense with much intercellular substance and relatively few cells, while other portions have but little intercellular material and are very cellular.

Owing to the lack of sharp detail in these decalcified specimens the cell outline is indistinct but in general they appear to be elongated. The nuclei are either rounded or elliptical in shape and vesicular in character. Their size, number and arrangement surely indicate an active tissue. These cells conform to no particular arrangement though in one slide they were grouped into rather poorly defined, elongated alveoli or processes. Blood vessels are numerous in some situations and less so in others. Most of them have thin walls and are engorged with blood. Blood corpuscles are also scattered thru the tissues. A number of leucocytes have wandered into this tissue and many were killed and fixed in the various shapes they assumed in their ameboid movements. Other wandering cells are present but are not especially numerous or striking.

The eye did not present much change. The iris appears to be thicker than usual with numbers of wandering cells present and a separation of its tissues by edema. The vitreous

evidently contained a small amount of an albuminous exudate as it has coagulated and is found adhering to the retina as thin pink film. In the orbital tissue, attached to the sclera, there are wandering cells to be seen. These indicate an irritation.

Diagnosis: Retrobulbar ossifying spindle cell sarcoma. Mild grade of iritis.

Dr. Case observes that the long time elapsing before the tumor grew to the size it had attained at the time of the operation, with the present history of good health, is certainly convincing evidence that the disposition of the growth is not as malignant as its name implies. Histologically it does not appear to be very malignant, but the picture shown in the preparations is, in his opinion, that of sarcoma and he therefore diagnosed it as such.

The patient was discharged May 29th and has since been under the care of Dr. Stine of Lancaster. He was last seen by me June 23, 1924. The orbit was filling with healthy granulation tissue and there was characteristic retraction of the lids along the roof and floor of the orbit.\*

Primary sarcoma of the orbit is a rare affection. It may arise before birth and at all ages. The commonest seat of round cell sarcoma is probably the periosteum. Some sarcomata which are undoubtedly periosteal in origin contain osteoblasts and have fragments of bone formed in them; these are termed osteosarcomata. (Collins and Mayou.) Fuchs makes no mention of osteosarcoma.

If in this case the growth had its origin in the periosteum it must have spontaneously separated itself from the wall of the orbit as no attachment was found at the time of the operation.

The interesting features of the case were the rarity of this type of sarcoma in the orbit, its unusual size, and the difficulty this occasioned in its removal.

In case of unilateral nonpulsating exophthalmos the cause is still at this day difficult to determine, notwithstanding the aid rendered by X-ray study and transillumination. The revelations of the

\*The patient was again seen by me December 5th, 1925, and there was still no recurrence.

operation often confute the preoperative diagnosis. Palpation rarely aids us in a right conclusion and is frequently misleading. Two recent cases illustrate this. In one the growth in the frontal lobe of the brain had produced almost complete erosion of the roof of the orbit and the protrusion of the globe was due to direct pressure of the dura upon the globe. The other was one of cylindroma of the lacrimal gland, of very slow growth. In both of these cases, as in the one here reported,

a distinct firm mass could be felt in the anterior part of the orbit just behind the brim but most marked inferiorly, and led to the conclusion that the growth was a diffuse one. In the cylindroma this condition was present aside from the primary tumor.

These masses are probably to be explained by engorgement of the orbital veins, some edema, and possibly an increase or displacement of the orbital fat.

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### CHOROIDAL SARCOMATA.

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Two cases of this condition are reported. One of the patients remains in robust health, the other died of sarcomatosis. In each case the globe was removed and in one there was no recurrence of disease in the orbit. Read before the Section on Ophthalmology, College of Physicians of Philadelphia, April, 1926. (See p. 765).

Choroidal sarcomata are not rare, yet one may go for many years without personally receiving a case in hospital or in private. Indeed, in the past ten years only two have come under my care, one in hospital service and the other in consultation. The hospital patient is in robust health, while the other died of generalized sarcomatosis.

#### CASE ONE.

The first case is of a man who came to my clinic at Wills Hospital, August 10, 1922. He was employed in the stock room at one of the department stores. He was 52 years of age and had had perfect health, but was much concerned because of a sudden defect in the field of vision of his left eye. This defect I discovered to have been caused by a separation of the retina in the inner lower quadrant. Externally the eye was entirely normal and, on palpation, of the same tension as the right. He was directed to return after a few days and again in a month or so. At each visit there was no perceptible change in his symptoms. Once, I sent him to Dr. Zentmayer for his opinion as to the cause of the separation, but he was no more certain than myself. Nevertheless I told the man it might be one of new growth, and urged him to report frequently for general examinations. His visits ceased until the

8th of September 1923, when he came to my office, on a day when he knew I would not be at my clinic, because he had had discomfort in his eye in the past seven days, and was then in much pain. In the rather long interval since his last visit there had been nothing to concern him, altho he had had no sight at all in the left eye for seven months. There were now evidence of glaucoma; the pain for the past three days had been sharp to severe, in the past twenty hours. The man accepted my opinion that it was a tumor, yet he begged delay in enucleation. He was no longer plump but pale and emaciated; while his hair had lost its gloss. Eserin was instilled, and continued for two days which gave him comfort and he slept well. General directions were given and I did not see him again for seven days; the eye had become white; the pupil contracted, and the tension less than at a week ago. He was a bit more reconciled to his fate; yet, encouraged by the relief afforded by the treatment in the past few days, he delayed until on the 20th of September, when he met me outside the Hospital to beg me to attend to him immediately, because for three days he had been in excruciating agony.

At four o'clock under local anesthesia by deep injections of procain

and adrenalin, I excised the eye with a good bit of the nerve attached, without accident, or unusual signs except the freest hemorrhage after the globe was removed, doubtless because of the relaxation after adrenalin action.

He had so greatly revived that he was able to leave the hospital in five days. For several days he enjoyed a huge "black eye." The socket healed promptly, and after a week or so the man obtained a glass eye and disappeared until he came to see me at my office on the 13th of August, 1925. He had grown robust, had not lost a day from work. The socket was deep and healthy and the movement of the orbital mass quite free. His glass eye had been comfortable and had never irritated the tissues. On March 18, 1926 he returned, by request, when all things were healthy.

To confirm the diagnosis, the globe was sectioned immediately after the enucleation when it was disclosed that a mass nearly filled the vitreous chamber. It was chocolate-red in color, and quite soft to the touch. It had grown out from the inferior nasal quadrant, and was adherent to the porous opticus.

On microscopic study it proved to be a small round celled sarcoma; in some sections the cells were hidden by the excessive pigmentation. The nerve and scleral tunic were apparently not affected.

#### CASE TWO.

The second case occurred in a physician aged 60, whom I saw first late in August 1923. He was prostrated and in great agony from the effects of glaucoma in the right globe. Dr. Brinkerhoff had been in attendance from about April 1, 1923, when Dr. S. had gone to him because of a sudden loss of sight. At that time a detachment of the retina was detected in the lower inner quadrant, but the globe was not hypertensive, and there was no pain; there had been nothing to suggest the likelihood of a neoplasm causing the prominence in the fundus. In his early professional days he had been so unfortunate as to receive luetic infection of his hand. He had been carefully treated by the methods in vogue at the time, yet the incident had given

him great anxiety ever since, and he was especially fearful that his ocular symptoms might be due to an extension of that infection. As a matter of fact, when he was tested by Dr. B., there was a strongly positive complement reaction.

I felt sure the fulminating symptoms depended upon an intraocular growth, and the profound depression, I feared, indicated systemic metastasis. An immediate scleral puncture eased the pain, but we suggested the necessity for enucleation which the patient sought to delay. On the 5th of September he consented to the removal of his eye. This was done under local anesthesia. In the dissection the globe burst, the rupture passing thru the line of the previous puncture, and, there was a derangement of the periocular tissues which prevented the inclusion of the stem of the bulb so that the nerve was severed close to the scleral line.

Dr. Brinkerhoff immediately sectioned the globe and found a mushroom sarcoma in the lower nasal quadrant.

At the end of five days the patient had so revived that he yearned to leave his sick room and all else behind him, and he was allowed to go off to the seashore where he remained for nearly three weeks. The socket presented no gross anomaly and healed perfectly. A glass eye was ordered. He did not report again till March 25, 1924. In the interval, he declared, he had enjoyed the best health that he could recall in his life and he had gained in weight and vigor. The orbit had given him no trouble until in the previous ten days when the socket contained much thick mucus; but this he had controlled somewhat by the use of a zinc lotion. The prosthesis had been comfortable but he had not worn it for the two or three days past.

I found the orbital tissues quite edematous and the base of the cone irregular, in the manner one so often sees produced by the pressure of the glass shell. On careful palpation, however, the prominent portion was found to be dense, hard and immobile, and, apparently, adherent to the nasal wall of the orbit. It was neither tender nor



painful. I sent him off for a radiographic study to Dr. Pfahler, who reported that he had found evidence of tumor involving the inner third of the orbit extending to the sphenoidal fissure. No destruction of the neighboring structures had occurred.

In two days the orbital tissues had undergone distinct alteration in volume and appearance. The prominent mass had become divided into two mound-like surfaces separated by a ridge, one of which seemed to be adherent to the inner wall of the orbit. The nodules were easily palpable. The shell had not been worn for a few days so there was freedom from discharge and edema.

The outlook seemed quite gloomy to me, yet encouraged by Dr. Pfahler's agreement with my own idea, that radiations might be of great benefit, radium was applied to the orbital tissues. At April 1, my notes show that three applications had already been made, the first of 20 units for three hours, which had greatly reduced the masses, so much so that that portion in the inner wall was no longer palpable.

In the succeeding weeks radium and high voltage X-ray were applied to the orbital and both temporal regions, intensively, which caused a sharp dermatitis, amounting to an erosion of the lacrimonasal region, which continued for three weeks. Attempts to wear the glass eye were forbidden.

As many as six applications of radium had been made by June 19th, and once the coil had been used; in all as many as ten cross firing X-rays. There was a distinct condensation of the orbital tissues at the nasal side. The whole mass still could be moved by muscular action.

At August 13th, no radium had been applied for several weeks. The orbital masses were no longer palpable, but a synechia of lid and orbit had formed, and, altogether, the socket was shallower than ever before. Of course, no attempt was made to insert the shell, lest it irritate and excite the growth. There was the least dermal reaction yet noticed. The patient was in a happier state of mind, and he had been steadily occupied in his professional business.

By Sept. 12, the socket had continued free from inflammation, no signs of masses could be made out in the tissues, yet the conjunctival sac was shallower than before.

In the next two months frequent visits were made to me. He had become quite sensitive to the empty socket, there was the strong desire to wear the prosthesis, yet I forbade the use of it.

On December 11, he complained of pains in his legs, and of feeling aged. All his bodily functions had continued undisturbed and the superficies as usual, and no changes in the condition of the socket were visible. My notes ceased here, except that Dr. Reese noted, in my absence, on May 29, 1925, that the socket was in good shape.

The microscopic study of the eye showed a small round celled sarcoma with but scanty pigment; and what was present seemed to flow, as it were, away from the mass of cells. The collapse of the globe and the insistence by the patient that it should be opened on enucleation to verify the diagnosis, prevented the careful study we all so much desire, and I have no gross mount to show you. The record notes that the scleral wall was not visibly affected.

I did not see the patient again until called to his bedside October 26, 1925. For ten days he had taken to his bed suffering great pain in his abdomen and legs. He was profoundly depressed physically, yet his spirits were singularly bright and his mind alert. The orbital socket was as at the last noting. He was greatly emaciated, with hard protrusions of the shrunken abdominal walls. The external lymphatics moreover were nodulated, and all along the lines of the superficial vessels of the lower extremities there were tender and painful nodules. He was dying in my judgment, and the end came the next day. I could not obtain a postmortem examination, yet the embalmers were given permission to perform all their arts.

In the recital of these cases nothing new has been presented for your consideration, yet the subject of ocular tumors is ever new, as witness the sad case Dr. Posey recited a few meetings ago. Malignancy has long been a



source of enquiry to me. I am no nearer a solution of the problems connected with the origin of such tumors and their dispersion thru the system than I was when I first began my enquiries. Why is it that two masses of the same size, similarly localized and of like consistence should present differences in general manifestations? The one a part of a process extensively diffused thruout the body; the other to be presumably confined to the globe? Such problems remain among the mysteries of pathology. I have fancied, from my studies of many slides, that the tumors showing intense pigmentation (irrespective of the characteristics of the special cells, might be less actively malignant than are those with but little pigment. Such phases were manifested in these two cases cited, tho I admit they are but clinical

coincidences, and the tenure of the life of the survivor is uncertain.

Another point comes into my thoughts, and I have had but few opportunities to express any of my thoughts on choroidal tumors. Are the cases fatal from rapid manifestations of generalized symptoms always those of primary development in the globe with transference to the body, or are they the expression of a general process depositing its cells in the choroid?

In conclusion, as a matter of clinical observation, I am convinced that when signs of secondary glaucoma have set in, in cases of uveal neoplasms, it is fatal to delay the excision of the affected globes, and finally, that radium should be applied to the orbital tissues as soon as obtainable after excision.

315 So. 15th Street.

### AN UNLEARNABLE PRISM TEST FOR SUSPECTED MONOCULAR MALINGERING.

EDWARD H. SCHILD, M.D.

CANTON, OHIO.

A prism and plate of glass with parallel sides are so combined that either can be held before the claimant's good eye and changed without his knowledge. Skilfully used it reveals any false claim of monocular blindness and can be made to show how much vision the alleged blind eye really has.

In cases where an eye has been injured and the question of compensation arises, this test may be used to determine the degree as well as the pres-

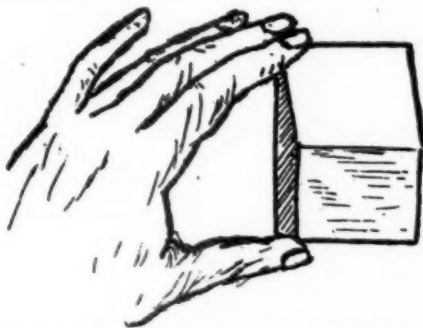


Fig. 1. Schild's test for suspected malingering.

ence of visual ability in a damaged eye in the face of an antagonistic attitude on the part of the claimant. It is therefore of especial value in industrial cases for adjusting compensation when the statements of the claimant seem out of proportion to the visible evidence of injury.

It consists of a small piece of rectangular glass about 1x2 inches, one-half of which is rather thick plano and near the middle line tapers off to a prism of 5° for the other half, as shown in the illustration. It is important that the base line of the prism which runs across the middle of the glass should be as sharp as possible so as to make an abrupt change from the plano to the prism side. If the polishing is done in a slovenly manner so as to round off this edge more or less, there will be a wide blur extending across the field of view when the test is made and this is to be avoided. For the same reason scratches or other blemishes should not appear on the surface.

A suitable test object must also be provided. For an ordinary case, when one merely wishes to confirm a patient's statement that his eye is blind, any small bright object against a plain background will do. An electric bulb or other bright light is not recommended, as it may cast a blur across

the field between the two images and utterly spoil the test. A small white visiting card is best.

With this glass, one may produce the effect of either a plano, a double prism or a single 5° prism according to the way the glass is held before the eye. With the prism end uppermost, if the dividing line be held just above the pupillary border, the view will be thru the plano part only, this we shall designate as "position 1." By lowering the glass a trifle, enough to bring the dividing line midway across the pupil, we get the effect of a double prism and the eye sees a double image. This is "position 2." Again lowering the glass, enough to bring the dividing line just beyond the opposite edge of the pupil, we get the effect of a single 5 prism. The eye sees a single image again, but this image is now displaced upward. This is "position 3."

The shifting from position 2 to position 3 is the critical stage of the test and must be done at a moment when the subject has both eyes open and his attention engrossed on the images, so that he will not notice the change. To accomplish this, the glass must be held lightly by its edges between thumb and forefinger, not letting the edge touch the nose. If both eyes see equally well, there will be no movement in the images and he will not discover the ruse. During the entire examination, we concern ourselves solely with the good eye, paying no attention to the damaged eye.

Altho it is immaterial which end of the glass is held uppermost, it is better to adopt a definite routine and so start out holding the glass with the prism end up. Later on, if the subject shows signs of memorizing his replies, the test may be momentarily removed from in front of the eye and secretly reversed end for end, as often as may seem desirable.

Let us assume that we have a man who claims that his left eye is poor as the result of some trivial injury and that there are no visible signs to indicate the degree of damage as claimed. The other eye is normal. Hold the glass before the right eye in position 1. Inquire of him how many cards he sees. He should under all circum-

stances see one only, no matter what the condition of the left eye may be. Now move the glass to position 2. He now sees two cards with the right eye irrespective of left eye, as the double prism produces a diplopia in the right eye. If the left eye is actually good, its image will fuse with the lower of the two seen with the right eye, he will therefore still perceive only two images. Ask him: "How many?" and after receiving his reply "Two," repeat the question at the same time shifting the glass to position 3, being careful not to let him notice this change. If the left eye is actually blind, he will now see only one image, but if he says "Two," it shows that he sees one of them with his left eye which he declares is blind and thus exposes his attempted fraud. Should the left eye have some vision, this may be roughly estimated by his replies, he will likely state that he sees two images, but one of them is blurred, etc.

Thus far we have contented ourselves with establishing the fact that the subject either can or cannot see with the alleged blind eye, or getting an approximate idea of the visual ability, if the eye is defective. But when it is desirable to obtain the visual acuity, as accurately as possible without being favored with the candidate's cooperation, we face a greatly increased difficulty, since this is a purely subjective examination. With our prism glass, and a certain degree of adroitness, a very fairly accurate estimate may be elicited. We proceed in a manner similar to that already described but use a single, horizontal row of letters, running in graduated sizes from 20/100 to 20/20 in place of the plain small card. If the examiner possesses a test type cabinet which exposes only one row of letters of a given size at a time, he has an ideal arrangement. If not, then he must provide himself with a test card for that purpose. Such cards have been published for school room examinations but one may be made by cutting up an ordinary test type card and selecting one letter of each size, these letters are then pasted on a fresh piece of cardboard.

Running rapidly from position 1 to position 2, we ask the candidate to read

off the upper and lower rows. While he attempts this and has his attention engrossed on the letters, we lower the glass to position 3, and note carefully the result. If the prism end is held uppermost, the reading of the upper row will be that of the eye provided with the glass and the lower row that of the other eye. The examiner must always bear in mind how the glass is held, for if it is reversed, with prism end down, naturally the reading will be reversed also and the upper row will be the reading of the defective eye. The reading of the good eye will always be in the direction of the prism end and that of the defective eye in the direction of the plano end.

Should the subject have a marked eso- or exophoria, his muscle balance

may be sufficiently disassociated thru the action of the double prism under position 2 that he may report "three images." A statement by him to this effect would indicate at once, without going any farther, that he sees with both eyes and that he has a phoria. For a precise indication of his visual acuity, it will then be necessary to place a test case prism, of proper strength to correct the phoria, base out or in, as the case may be, behind the planoprism glass and proceed as above outlined.

317 Brant Building.

The proper preparation of this test prism presents some technical difficulties. It may be obtained of the W. A. Jones Optical Co., 315 1st Natl. Bank Bldg., Canton, Ohio.

### PTOSIS SPECTACLES.

JAMES MOORES BALL, M.D.

ST. LOUIS, MO.

The history of mechanical appliances to hold up the lid is outlined. Following the lines laid down by Mackay the writer's favorable experience with such devices is here reported.

Mechanical devices for the correction of blepharoptosis have been used for many years in varying forms, but have received little attention at the hands of American ophthalmologists.

Lifting the eyelid with a strip of adhesive plaster, or by pinching a fold of skin with small forceps or clamps, is unsatisfactory. Use of a spring appliance, whereby a piece of wire presses the eyelid upward and backward from the pupil, without preventing closure of the eye, has been of practical value to patients who wished to avoid surgical intervention. The principal mentioned has been applied in two ways:

I. By passing the spring over the head, from the frontal to the occipital region; and

II. By having the spring attached to a spectacle frame.

The first method was described by Dr. MacKness<sup>1</sup>. Mackenzie<sup>2</sup>, says of it, "The neatest contrivance for elevating the upper eyelid, in single or double ptosis, is that of Dr. MacKness. A very thin and narrow piece of ivory, forming the segment of a circle, is riveted upon a piece of mainspring of

a watch, about eight inches long. The loose end of the spring being carried thru the hair over the crown of the head to the occiput, the piece of ivory is placed upon the eyelid so as to keep it open. The piece of ivory, being very narrow, is completely hid in a fold of the eyelid, while the spring being accurately painted to imitate the color of the skin, is scarcely observable. As the eyelids occasionally require closing, in order to keep the eye moist, the patient soon acquires a knack of raising the spring to allow the eye to wink, and then replacing it again."

The second method was mentioned by Mackenzie<sup>3</sup> in an early edition of his book. After describing the case of a woman whose eyes were kept "alternately open by a bit of adhesive plaster, attached to the lid and fixed by its other extremity to the brow," this wise Scotsman said:

"A neater contrivance for elevating one of the upper eyelids, in double ptosis, would be a bit of silver wire, bent into a concave form, and fixed to the frame of a pair of spectacles."

A concave crutch of thin wire, projecting backward from the upper rim

of a pair of spectacles, was devised by Turner.\*

Orbital eyeglass frames for use by blepharoptosis patients, have been devised by Dr. Rayner Batten.<sup>6</sup>



Fig. 1. Crutch spectacles (Mackay)  
(A) For right sided ptosis.  
(B) For left sided ptosis.  
(C) For bilateral ptosis.

It also shows how the spectacles may be fitted with curled sides or with an elastic band.

"These orbital eyeglass frames" he says, "depend for their attachment to the face on two rigid, or nearly rigid wires, attached to the lower part of the frame, and accurately adjusted to the nasal margin of the orbit, terminating in a free end lying immediately beneath the upper margin of the orbit."

In May, 1922, in the discussion of a paper on "Ophthalmoplegia Externa"

by Dr. Harry Friedenwald<sup>6</sup>, at the 58th annual meeting of the American Ophthalmological Society, held at Washington, D. C., Dr. George Mackay,<sup>7</sup> of Edinburgh, made a practical contribution to our knowledge of "Crutch Spectacles for Ptosis."

Dr. Mackay said: "The first essential for a suitable frame is to select one of such dimensions that, when viewed from in front, the upper edge of the glass holding rim coincides in outline with the curvilinear sulcus in the skin of the upper lid, which indicates the upper edge of the tarsal cartilage and the line of traction of the levator palpebrae superioris upon it.

If the ptosis be one sided, this measurement may be more easily taken from the better developed sulcus of the unaffected lid. If both upper lids droop, the curve may have to be judged from the contour of the upper surface of each eyeball as felt thru the lids. Measurements should next be taken of the distance between the upper edge of the frame and the surface of the lid at three points at least, one central, another toward the nasal, and a third toward the temporal end of the rim.

A piece of wire should now be molded so as to adapt itself quite uniformly into the sulcus of the eyelid and the two free ends must be cut of suitable length so that they will maintain their contact with the skin after being welded to the metal rim of the spectacle frame. It is obvious that the temporal limb of the wire will require to be longer than the nasal limb, and that the central segment of the wire must possess two curvatures, the one in an anteroposterior plane, the other in a vertical plane, the latter maintaining parallelism with the curve of the



Fig. 2. Ptosis from injury during a forceps delivery.



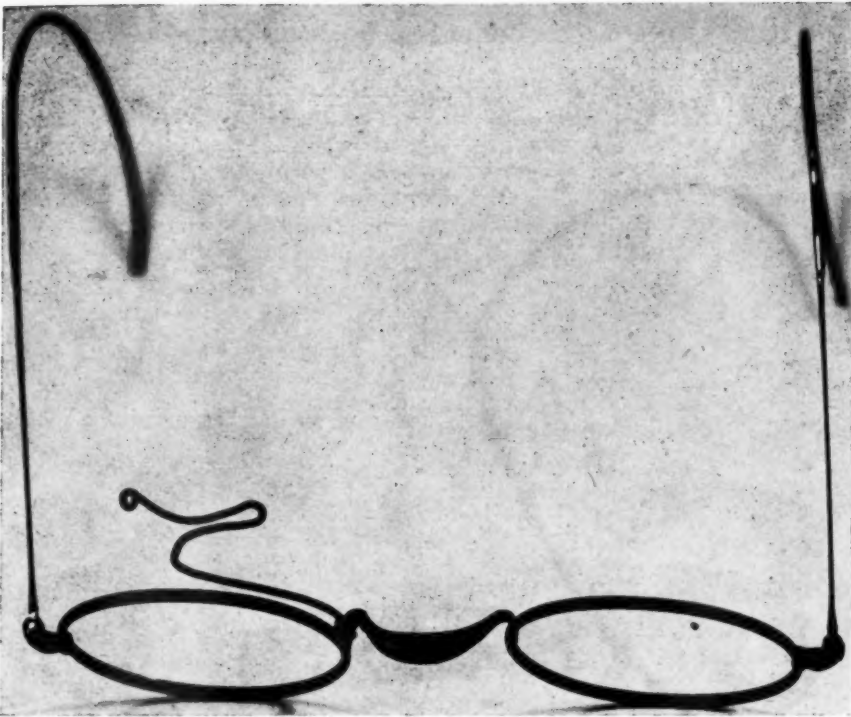


Fig. 3. Ptoxis spectacles made by Mr. A. P. Thursby, of St. Louis.

sulcus and of the upper border of the spectacle frame.

The wire must not be too thin, so as to cut into the skin or excoriate it, nor be sharply angled. The whole frame should be kept of light weight, and its sides as elastic as required. Contact with the skin can be maintained either by curled wire sides passing behind each ear, or in children it is sometimes more satisfactory to employ straight sides with fenestrated tips joined by

an elastic tape passing around the back of the head. In any case the pressure upon the lid should be so lightly adjusted that while the frame holds up the lid to a natural position, it does not prevent it being closed by the action of the orbicularis in blinking. The elastic sides or posterior tape should have sufficient elasticity to elevate the lid when the orbicularis ceases to contract.

Such a device is, of course, especially



Fig. 4. Ptoxis spectacles in use.

suitable when the ptosis is accompanied by the presence of some error of refraction which makes the wearing of glasses desirable in any case."

The subject of the accompanying photographs is a young woman, aged nineteen years, whose ptosis has been constant since birth; and was credited to pressure during a forceps delivery. The right levator muscle (assuming it to be present) is paralyzed. Vision of each eye was 20/32. Examination

under atropin disclosed 1 D. of hypermetropic astigmatism in each eye. When corrected, vision of each eye = 20/16. Ptosis spectacles carrying appropriate lenses were ordered, and the patient was requested to wear them for several months. After a brief period, however, she insisted that an operation be performed. Tansley's procedure was selected. The cosmetic result was good.

4500 Olive St.

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### EXPERIMENTAL AND CURATIVE APPLICATION OF PEPSIN IN EYE DISEASES.

FRANK NARÓG, M.D.

LWÓW, POLAND.

Experiments in the therapeutic use of pepsin made in the Ophthalmic Clinic of the John Casimir University of Lwów, Poland, directed by Professor A. Bednarski, are here reported. The trials were made in lid diseases due to cicatrices in trachomatous pannus and in turbidity of the vitreous. In pannus and deforming infiltration of the tarsus it was found a helpful remedy. In diseases of the vitreous the benefit was less certain. First presented to the meeting of Polish Oculists in 1924.

The application of pepsin in eye diseases has been made in our clinic for two years. The respective experiments with it are divided into three parts, namely:

1. The trial experiments with pepsin in lid diseases due to cicatrices.
2. In pannus trachomatous and corneal cicatrices.
3. In turbidity of the vitreous body.

The pepsin application is almost unknown in the ophthalmic literature. After applying the pepsin for a year, I learned that Nikolaus Blatt in 1920 made one experiment with pepsin in eye diseases. He applied in an experimental way 3% solutions of pepsin in physiologic salt solution, which he injected into artificial corneal cicatrices of rabbits. But in man he injected these solutions in a few cases, into the true corneal cicatrices. Blatt confirmed in the rabbits the corneal cicatrices clearing up, but in the men the result was variable. The place where

he punctured with the needle, a turbidity was left in the cornea. Besides this he noticed pain in the eye after the injection. He therefore advised the making of control experiments. Independent of this author, I made experiments with pepsin in other solutions, and by other technics because pepsin in physiologic solution, being neutral, is less fit for injections, for the pepsin action appears in acid media.

The surgeon's work has encouraged these experiments. Pepsin application in surgery has been known for quite a long time. Payr was the first who used it in different forms. Afterwards Rostock, Schönbauer, Pitzen, Hedri and others extended the experiments. Among the Polish surgeons to help in this advancement was Gruca. Their problem was to get a substance fit to soak thoroly and to dissolve the cicatrices, and to avoid the peritoneal adhesions after laparatomies. Then an investigation of the so-called antipep-

sin was made. As preparation they used the "Pepsinum absolutum" of Merck with digestion force 1:10,000 in solution of Pregl, Stersin 5 and 3, namely "pepsinum sterilisatum" of Kathe in Halle equal to the Merck's pepsin as to value. The experiments of these authors followed three directions: The chemical experiments with digestion force with which the albumin in vitro is digested by the pepsin; the blood changes made by injections in animals; and the therapeutic experiments in men. Payr obtained very satisfying results in his work, observing the pepsin action in 35 cases. He thinks the pepsin action is excellent, in comparison with the fibrolysin's uncertain effects especially with regard to cicatrices. In a similar way Gruca obtained successful results in all his scar cases. Payr used for the injections the colloidal solution of 1% pepsin in isotonic Pregl's liquid. Gruca used the same method of injections, but he dissolved the "Stersin V" in Jodico-jodata solution P. 5, which is said to be identical with Pregl's solution.

Relying upon Payr's and other authors' works, as giving in surgery good results in cicatrix dissolving by pepsin, I tried to bring it into use, as follows:

#### 1. PEPSIN APPLICATION IN CICATRICAL EYELIDS.

For two years I applied injections of pepsin solution in eyelids subcutaneously and under the conjunctiva. The firm W. Kathe, Halle furnished me kindly with preparation Stersin V, "pepsinum sterilisatum." I dissolved this sterile pepsin in jodico-jodata P5 solution "Laokoon." Since the pepsin is useful as sterile, after the solution has been made 8 to 24 hours, I prepared small doses only and added to this solution 2 to 5 drops of 3% lactic acid, in order to activate the ferments. I also made pepsin 1:100 in solutio HCl. 3:1000. The color of jodico-jodata solutions was opal, and that of HCl solutions was aqueous. In order to reduce the pain, I sometimes injected at first  $\frac{1}{2}$  gr. novocain with adrenalin. I got thus  $\frac{1}{2}$ % solution of pepsin which I gradually in-

jected into the cicatrices, carrying the needle from the skin or palpebral conjunctiva. I also was careful that the solution be equally distributed. I dropped 2% cocain in the conjunctival sac previously.

In cicatrized eyelids and in conjunctival trachoma I applied the pepsin in 45 cases of the out-patient department and in 7 clinical cases. One of these cases was of ectropion in tuberculosis, 18 cases of entropion and trichiasis of trachoma, 3 cases of senile entropion, 3 cases of spastic entropion. The trachoma with cicatrized tarsus, often deformed and infiltrated, and granular trachoma comprised the remaining cases.

I noticed a good result in a thick cicatrix coalescent with the periorbitum, and in consequence ectropion lagophthalmus with ulcer. When the injections were made into the cicatrices, in the course of a fortnight, the cicatrices softened thoroly, and loosened, so that closing of the eyelids became possible and the ulcer was healed.

A clinical patient had bilateral spasmodic ectropion of the lower eyelids, which had lasted 3 years in consequence of conjunctival catarrh with swelling of the eyelids. A Snellen operation was made 2 years before. About 6 months later the eyelids became everted the conjunctiva congested, swollen, greatly reddened and thickened; the surface irregular and granular; in consequence of hypertrophic papillae. When 2 injections were made in this case, a very remarkable improvement followed, and after 2 years, the closing of the eyelids became possible. There were never any cicatrices, but the treatment succeeded according to Payr's theory; that the pepsin digests the nervous tissue, in vitro, and lessens the neuralgia after injection into any nerve region, by palsy of nerve endings. I noticed this case two months later. The improved state remained.

It may be said that every liquid injected makes an improvement. After the injection of novocain, a swelling was made. When the swelling disappeared, the eyelid came to the preced

ing state. However, when the swelling disappeared after the pepsin, a constant improvement was noticed, for the eyelids nearly returned to a normal state.

As satisfying results may be counted the improvement in some cases of ectropion with hypertrophy. These cases of ectropion, in which the improvement occurred belonged to the spasmodic or hypertrophic type, where the pepsin acted in one case, by paralyzing the nerve endings, and in 2 by loosening and dissolving the overgrown tissue.

In cases of trichiasis with entropion, only half obtained satisfactory results. In other cases a partial improvement was made. In consequence of their previously having been pulled out, the lashes had sometimes to be removed by a galvanic needle, or by an operation.

I injected in the tarsal region, and got satisfying results in about thirteen cases of cicatrized trachoma with tarsus bent in the shape of a small boat, deformed and infiltrated. The tarsus became soft, the roughnesses which were constantly irritating the eyeball disappeared, and the patients had no longer the sense of irritation with an imaginary object; and after 2 months of observation they ceased to be chronic clinic patients, as distinguished from those who were not injected, and were so annoyed that they constantly returned to the clinic.

The history of a student is evidence of the cicatrices dissolving and the eyelids becoming thinner. The patient caught the disease about 2 years before. Both eyelids were everted, the conjunctivas were growing thick, cicatrized, infiltrated, roughly irregular. The tarsus were deformed and bent in the shape of a small boat. In the left eye marginal infiltration included half the cornea. The eyelashes were turned against the eye. After 3 injections of pepsin into both eyelids, the cicatrices were smooth, in the course of 20 days of such treatment the eyelids had grown soft. The ulcer was becoming clean.

In a few cases of granular trachoma, the injections under the conjunctiva, and the dropping in of pepsin solution,

together with some drops of lactic acid in the conjunctival sac, gave no improvement, or only a little. I also did not notice in these cases, after the conjunctival cauterization with lactic acid solution, any better results than those secured previously with other means. The applying of pepsin under the conjunctiva in cases of cured trachoma is successful when the granules are shrinking and the cicatrices are progressing. When newly progressing cicatrices are cured by the influence of injections, they leave thin, fibrous, hardly visible places. Cases of cicatrices in process of forming are cured by sublimate rubbing. They are the fittest for that kind of curing. In one case, a boy with granular trachoma, observed in a clinical way after 3 months treatment, 8 injections under the conjunctiva, had nearly invisible fibrils of tissue in the limit of fornix.

I did not notice any improvement in cases of senile ectropion. In 2 cases of ectropion, with pannus trachomatous and infiltrations in the cornea, not only the eyelids improved, but the cornea also cleared up, and that impelled me to apply the injections to the cornea.

## 2. PEPSIN APPLICATION IN PANNUS TRACHOMATOSUS AND CORNEAL CICATRICES.

The results in trachomatous pannus and superficial corneal cicatrices are undoubtedly the best. Before I began to apply the pepsin in man under the conjunctiva, I tried experimentally to inject it in the same way in dogs. The dog felt no pain from the injections of pepsin solution  $\frac{1}{2}$  per cent with novocain and adrenalin. A small swelling of the bulbar conjunctiva with small reddening disappeared 5 hours after the injection. The examination I made in vitro, with the corneal shred removed from the eyeball, showed after some time a partial digestion.

The case of Z. J., 21 years, in which degenerate changes in the corneas appeared, taking  $\frac{3}{4}$  of the cornea, is to be counted in best results. The patient was treated locally 2 years, by all possible means in outpatient department. When radiation by ultraviolet rays had been made, a slight improvement oc-



curred. Diagnosis, cicatrized trachoma, trachomatous pannus, girdling corneal degeneration. In the right eye: a gray and white film of degeneration with dimensions 9 mm. long and 4 mm. broad, by Wesseley's keratometer ran thru the corneal center. The corneas were supplied with blood vessels and turbid. V. R. fingers before the eye. V. L. Fingers 20 cm. After 8 injections the corneas greatly cleared up, and became bright near the circumference. The degeneration films reduced to  $\frac{3}{4}$ . V. was corrected to R. 5/30, L. 5/20. Reads Snellen 1. But with return of trachoma the left eye got worse, but soon improved. A constant improvement continued about a year. The patient has V. 5/15 and 5/20 and reads Snellen 1, with advanced corneal degeneration. When all remedies were exhausted during 2 years, the improvement following pepsin application, is to be attributed to that remedy.

Another case was that of a school mistress, M. H., who became ill about two years ago. She did not want an operation. The diagnosis showed sclerocorneal inflammation, central macula corneae. The treatment resulted in slight improvement with ultraviolet rays. During 20 days, 5 injections of pepsin under the bulbar conjunctiva were made. From the thick corneal cicatrix a thin small cicatrix in the center of the cornea was left. V. has improved from fingers  $\frac{1}{2}$  meter to 5/20.

In a table of 11 cases we notice very clearly an improvement in the correction of the vision. I put in that table some cases showing noted visual acuity. Others which were not constantly observed, had no recorded vision in consequence of their going away. There were about thirteen of those who improved. Most of these cases were locally treated by common remedies. In some cases we applied ultraviolet rays first. In case of lack of improvement of the visual acuity, we began the injections. After the injections of pepsin solutions, the corneas became clean and bright. The cicatrices became translucent, with sometimes a grey and sometimes a white shade.

In a case in which the whole cornea was infiltrated and flattened, the infiltration disappeared. The patient hardly had any perception of the light of a candle 6 meters away. After one pepsin injection, the cornea became so cleared, that the patient began to count the fingers.

I noticed in this case and in other ones, that the best result comes after injections in fresh cicatrices, during the clearing of ulcers, when the hyperemia had disappeared. Ciliary injection is not suitable for pepsin applications. The pannus trachomatosus improved in all cases, and sometimes completely healed.

### 3. THE PEPSIN APPLICATIONS IN TURBID VITREOUS.

The experience concerning this includes 5 patients.

In the first case, there was thick turbidity. the eyeground was nebulous. After six pepsin injections, the pupil soon became dilated. The eyeground became quite visible.

Iodin and mercurial embrocations, were applied in other cases. But when there was no improvement after 15 days, the pepsin injections were used.

Case 2 had vitreous hemorrhage with light perception. The day after the first injection of pepsin, the patient counted the fingers. Another case was similar. In one case of atrophy of the choroid the patient would continually get worse. The Wasserman test was in all cases negative. One gets impression, that a partial improvement of these cases can be attributed to pepsin, as in similar cases after iodine and mercury no improvement is to be noticed. The fibrolysin injection made in this kind of cases gave mostly uncertain results.

### TECHNIC OF INJECTIONS.

As to injection technic we must point out, that the pain lasted in one instance 6 hours. The swelling and pulpiness of the conjunctiva lasted 24 hours, and in three cases 48 hours. The pain was greater than after injections of an albuminous body. The next injections were less painful. The swelling disappeared after 12 hours, and the pain after 4 hours. The injections were repeated every 3 or 6 days, according to when the swelling disap-

peared. Some patients refused injections in consequence of their pain; others, when feeling subjective improvement, wished to get them.

Finally I began to apply solutions in small doses. That was less painful and the patients stood them well. The patient used cold compresses when feeling increasing pain. A slight improvement was noticeable after the first injection.

The control of both eyeballs was difficult, since the injection into one eyelid caused a slight swelling in the other one. This is mentioned by Payr and Gruca, and the latter noticed changes in the opposite cheek, when he injected a cicatrix in the first. That suggested a conclusion that the action of pepsin is not only local, but also general. The action is local in scars, and in tissue that is dissolved by pepsin, acting under the influence of acids, which are to be found in great amount as a result of the poor circulation. We find in these spots the following acids: carbonic, lactic, oxalic, butyric, and phosphoric. The colloidal tissue, under influence of pepsin, became slightly loosened, rendering possible the absorption. The dead cellular material was removed. The collagen was decomposed, and was replaced by new tissue.

According to Gaza, there is to be found in white blood corpuscles a ferment similar to pepsin. Iodin probably supports the absorption of tissue and removes infection. No negative action was noticed, nor was there inflammation in the new tissue. Adrenalin with novocain, when injected, causes anemia of neighbouring bloodvessels, so that the pepsin is kept a long time in the cicatrized tissue. This tissue contains few blood vessels, therefore it cannot get quickly to the blood circulation, as happens in healthy tissue. The action in cornea and vitreous, during injections under the bulbar conjunctiva, is to be explained by pepsin infiltration together with lymph.

The general pepsin action comes in consequence of its infiltration in the blood circulation. The action of pepsin is reduced with time. We do not know if antipepsin, as taught by Danilewski, Schwarz, Gruca is a reliable theory.

They say that the antipepsin is an antiferment in the blood in large and constant quantity, and it can join with pepsin. But I think that the weaker pepsin action may depend upon cellular disturbance in equilibrium bodies, which already contain a defensive apparatus, either in increased leucocytosis or increased alkalies of the blood. We hold to this, because we notice a weaker reaction of the body to later injections, as well after proteins, as after the inoculations. In the recently published work of Hilarowicz and Mozokowski, the authors explain the checking action of the blood serum upon pepsin digestion, not by existence of a specific substance, "antipepsin," but by the change in the hydrogen ion concentration.

The intramuscular injection of pepsin solutions may cause a feverish state, and the intravenous one a shock. The pepsin solutions with the salty acid acts stronger and causes stronger pains, than the solutions with iodine. This is because the iodine loses much of its sterilizing force as well as digestive force in vitro, when it comes in contact with the albumins of ferments. The most digestive value of all preparations (according to Rostock) belongs to Stersin 5, which is given by him as 100; Stersin 3, as 90, pepsinum absolutum Payr 82, and pepsin in lamellae 28. Since different preparations have different digestive forces, as stated by Rostock, they must previously be tried. I have been convinced that pepsin solutions are best for digestion according to this proportion:  $\frac{1}{2}\%$  in  $\frac{1}{2}\%$  HCl. The pepsin action decreases, when the digestive products assemble. A solution allowed to stand becomes unfit for use and loses its digestive force.

#### SUMMARY OF RESULTS.

My conclusion of the application of pepsin till now is as follows:

We have in pepsin a helpful remedy in trachomatous diseases of cicatrized eyelids. It is likewise helpful in infiltration with reformed tarsus, in conjunctival and eyelid cicatrices, and in some cases of ectropion and altering of eyelids. The pepsin as an auxiliary remedy exceeds all others in the treatment

of trachomatous pannus, and corneal cicatrices, because of its quick action; and gives best results in these diseases. Till now we cannot say anything positive about the action of pepsin on disturbances in the vitreous body. Regarding the present results, we are compelled to believe it has a great influence upon absorption in the vitreous. It has no influence in granular trachoma, neither in the form of injections, nor by dropping in.

The above results follow laboring under both high hope and depressing despair, during two years. The results are very much in favour of pepsin, principally in the treatment of pannus trachomatous crassus. In the past jequirity derivatives were used in

the treatment of pannus trachomatous crassus. Later they were not used because it was shown that they were without value. Pepsin at this time creates a new point in the treatment of pannus trachomatous crassus. It is known from the review of the ophthalmic literature, this treatment has never been used or tried in these diseases. We claim to have used these treatments first. These trials gave excellent results in many cases. The person diseased with pannus trachomatous crassus could feel the sense of light recovered with an effective vision. The permanent results after treating leucoma corneae by such treatment proved to be more effective in respect to cosmetic value than operations.

## NOTES, CASES, INSTRUMENTS

### OCULAR MUSCLES: SPLICE OPERATION FOR SHORTENING.

F. W. DEAN, B.S., M.D., F.A.C.S.

COUNCIL BLUFFS, IOWA.

Read before the Omaha and Council Bluffs Ophthalmological and Oto-Laryngological Society, April 14, 1926.

The operations for shortening an extrinsic ocular muscle to correct an imbalance, whether that imbalance results in a strabismus or merely a

phoria, are of three general types,—advancement, resection, and folding or tuck operations.

The varieties of these types, bearing the names of the ophthalmologists introducing them, differ for the most part in a change in the number of sutures used and in the method of their introduction and tying. The fact that there are so many operations devised indicates that some objections are found by individuals in the existing methods. The advantage claimed for

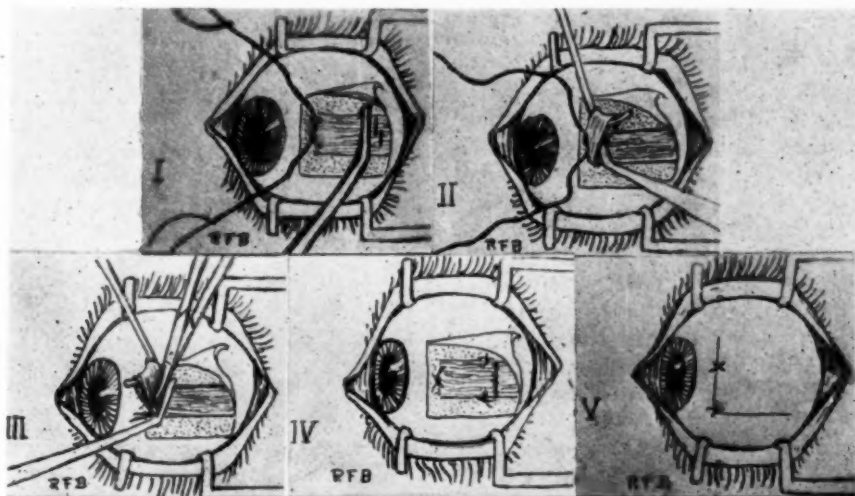


Fig. 1. I, Tendon exposed seized by advancement forceps and suture introduced. II, Forceps brought to insertion of tendon and suture tightened. III, Cutting loop of tendon. IV, Loop sutured to shortened muscle. V, Conjunctival flap secured in place by sutures.



the advancement operation is that the insertion being advanced gives the muscle greater leverage and consequently more power. Those advocating resection hold that if the muscle is shortened properly, an attachment at the original insertion gives the muscle its normal power.

In my experience either method produces satisfactory results; and yet I feel that no mistake is made when the attachment is left at the spot selected by some thousand centuries of evolution. There is an argument against the advancement operation, asserting that it is dangerous to pass a needle into the thin sclera in the vicinity of the ciliary body. Surely that is a question of an operator's knowledge of his skill.

The objection I find in both the advancement and resection operations is, that the suturing is done with silk requiring the eye to be bandaged for from eight days to two weeks while the muscle is reattaching. Altho the result may be perfect, the patient is subjected to more annoyance and discomfort with the protracted bandaging than is necessary.

Of the several tucking operations the Volk tuck is as satisfactory as any. Following a tuck operation in which catgut sutures are used, only the eye upon which the operation is performed requires bandaging, and that for not longer than three days. Some insist that catgut is not suitable for sutures in ocular muscle operations. If properly introduced, catgut sutures hold the muscle in its new position until it has reattached as securely as does silk. Any giving away is due to a faulty technic, and not to the suture material. Dr. L. C. Peter objects to the use of catgut in ocular muscle operations, stating that it may cause a tumefaction under the conjunctiva. I have had that condition follow the use of catgut but once in thirty years. Then it followed the use of twenty day chromacized catgut. I use 000, ten day, chromic, nonboilable catgut. This suture has the required strength, and when threaded and placed in sterile water for a few minutes is very pliable and is about as easy to handle as silk. The results of the tuck operation like that of advancement and resection are also satis-

factory, yet the objection is raised that the bunch under the conjunctiva, tho it disappears completely in time, does persist longer than the operator or patient would desire.

For small corrections I usually do a tuck operation. In cases requiring a greater amount of shortening, the operation I have been doing and wish to describe is one in which the objection of long bandaging is eliminated and the bunch under the conjunctiva is much reduced.

A right angled cut is made in the conjunctiva exposing the rectus to be shortened. The muscle is seized by an advancement forceps at the distance from the muscle insertion, judged correct for the particular case. The first suture is introduced as for a Volk tuck, catching the muscle just back of the advancement forceps and passing the ends thru the fibrous insertion of the muscle. The forceps is brought up under the attachment of the muscle as the suture is tied; at the same time the loop or tuck is held up with a strabismus hook. With scissors the muscle is cut close to the upper edge of the forceps and the forceps removed. The loop of the muscle is straightened out and sutured to the belly of the shortened muscle at each side. These three sutures, the one taken as a tuck suture and the two sutures splicing the tendon to the shortened muscle hold the splice very securely. The conjunctival flap is lastly replaced and secured by two silk sutures.

A gauze dressing held in position by adhesive strips is applied to the eye upon which the splice operation has been done. The dressing is allowed to remain three days when it and the silk sutures are removed.

*Council Bluffs Clinic Bldg.*

## **TRIAL CASE BIFOCAL LENSES**

J. MILTON GRISCOM, M.D.

PHILADELPHIA, PA.

It frequently happens in the course of refraction work, that the ophthalmologist is called upon to decide for the patient who requires both a distant and near correction, whether he shall have separate glasses or bifocals.



This applies in particular to those who are in the early stages of presbyopia, and who have possibly heard their friends complain of the annoyance of bifocals. It is comparatively easy to demonstrate the difficulties associated with separate glasses, since the distant and near correction can be placed in a

the author's trial frame. With this addition to the trial case lenses one may introduce the patient to the effect of bifocals by actually placing them before his eyes over his distant correction. These lenses are not used in estimating the reading glass, and are, consequently, only of service in demon-

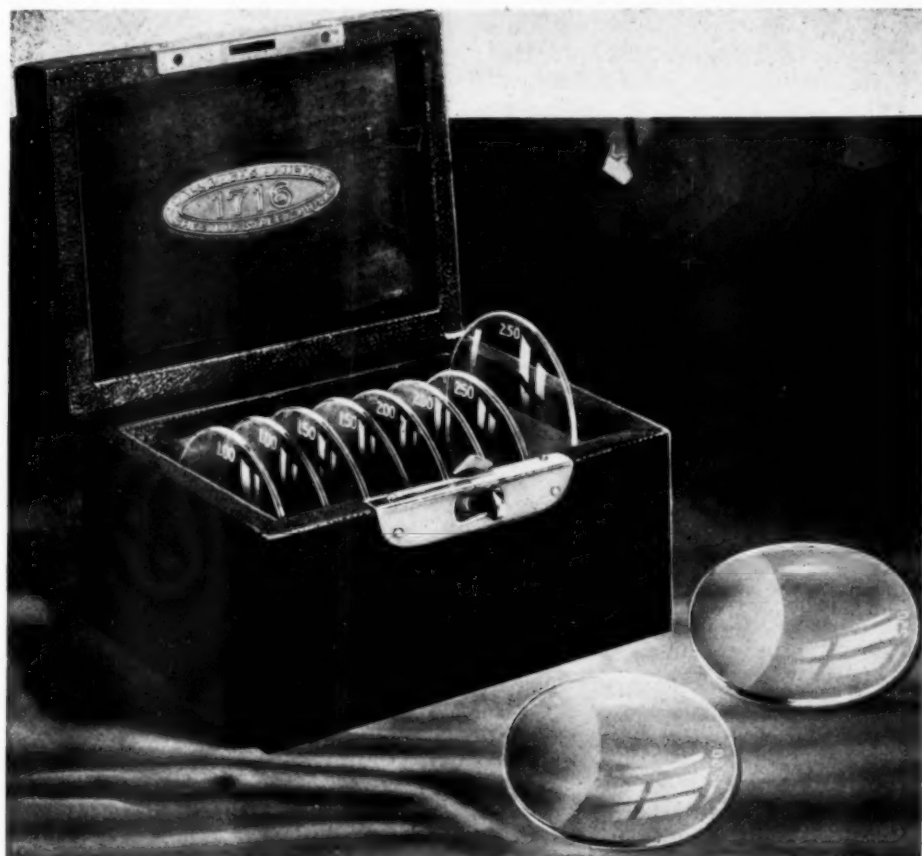


Fig. 1. Set of bifocal lenses (Griscom).

trial frame before the patient's eyes, but unless one has lenses similar to those hereafter described, it is impossible to properly illustrate the effect of bifocals. The writer felt that such an office demonstration would enable the patient as well as the ophthalmologist to reach a decision before the prescription was given. To that end a set of four pairs of Ultex lenses was made with a plain glass in the upper part and a +1.00 D, +1.50 D, +2.00 D, and +2.50 D, sphere respectively in the reading segments, which are 16 mm. high. The lenses are round, 38 mm. in diameter, in order that they may fit in

strating the effect of bifocals before the finished glasses are placed before the patient's eyes.

2213 Walnut St.

#### PIGMENTATION OF ROOTS OF CILIA.

FRANCIS BURTON BLACKMAR, M.D.

COLUMBUS, GA.

There seems to be a disease of the roots of the cilia of the eyelids (following measles in one case) lasting for years and not responding to treatment, which provokes intense itching and

black discoloration of the roots of cilia scattered over one or more lids.

Cultures of the roots on blood serum were of very slow growth and never produced any *visible* colonies. A few small gram positive cocci were uniformly obtained on the first cultures after several days. Only one subculture was obtained. All cultures from black cilia were uncontaminated by other organisms. One patient stated that the most efficacious treatment she had found was scrubbing the lid margins with the lather of mild soap. This suggests to me a facultative aerobe since the oil secreted around the cilia may more or less seal the roots off from oxygen.

Cultures from normal white rooted cilia produced uniformly sterile tubes when planted with blood serum slants. The cilia were extracted with sterile forceps and while still in the grasp of the forceps the roots ( $\frac{1}{2}$  mm. long) were cut off (below the lid surface level) with fine sterile scissors. The root adheres to one blade of the scissors. It was lifted from the scissor blade with a platinum loop and planted on the serum slant. Cultures were labeled black and white according to the color of the root used. The little growth obtained seemed to grow as well at room temperature as in the incubator.

The patients come to the ophthalmologist with only a few short stumps of cilia on one or more lids, and the remaining lids normal. As soon as cilia become long enough to grasp they are extracted by the patient in the hope of removing one of the diseased cilia. Removal of these black rooted cilia seems to give delightful relief from the intense itching. They can tell very accurately when a diseased cilium is grasped. Cilia with black roots can be extracted with much less resistance than those with white roots.

An attempt was made to inoculate a rabbit's cilia. There are in the rabbit no true cilia large enough to handle. However there is a tuft of large hairs just above the lid. I pulled these out and rubbed the area with a bouillon washing from an innoculated serum slant, and then with actual black roots. In addition to this, superficial scratches

were made (as for vaccination) across the skin where the cilia had been removed. These experiments gave only negative results.

The condition seems to remain on one lid for years. It neither necessarily spreads to other lids nor even involves all the cilia of the affected lid. One of my patients was a very intelligent woman. She named an imposing list of ophthalmologists whom she had consulted. Some had prescribed yellow oxid ointment, others boric acid drops; but none, including myself, were able to relieve the intense itching. No attempt to examine the roots of the cilia had been made before she came to me.

I was unable to detect any evidence of pathology on the surface of the lids which would indicate a black rooted cilia before it was extracted. I tried transillumination of the lids but no shadow was seen in the lid. The cilia (beyond the roots) have the same appearance whether they have black or white roots. Several cilia were extracted and embedded in liquefied agar for gross examination. The circle of agar after it hardened was trimmed into a minute rectangle and by placing this block in formalin it was well preserved. The various cilia in this way maintain the same relative position for study. Surface detail could be seen nicely.

There were a few scattered brownish granules upon the surface of the roots, but the color did not seem to depend on any granular pigment (at least none that appeared as granules under the low power of the microscope). The pigmentation seemed to be heaviest near the bulbous extremity of the cilia. This again suggests an aerobe for at this place the pathogenic agent would be most distant from the oxygen at the lid surface. On one cilium there was a narrow transparent filament, partially extending around the root shaft, about two-thirds of the distance from the bulbous apex to the level of the lid surface.

I hope at some time to be able to make studies from serial sections of the roots embedded as they are but as yet I have not been able to do this. Possibly such sections if properly stained

might show up the cocci which I have mentioned.

As controls, cilia were examined from normal eyes. The roots were uniformly white, and attempted plants on serum gave sterile tubes. A case with chronic marginal ulcers on the lids, around the cilia, was examined. Some of the cilia which I had removed, often on account of slanting back against the cornea were examined, as well as those growing out of the ulcers on the lid margin. All had healthy white roots. Cultures from these roots gave uniformly positive cultures of staphylococcus aureus.

The white root spoken of measures just about one-half millimeter in diameter. Mercurochrome was applied to

the lid margin and allowed to dry. The excess was removed with a cloth and several of the cilia in the center of the area extracted and examined. The mercurochrome had not penetrated beyond the very beginning of the root area. Its stain could, by careful inspection, just be seen on the shaft of the cilium.

Altho various antiseptic treatments were tried in these cases, no improvement was noted. The only treatment thought of, which promised success in my opinion, was the use of the X-ray or the ultraviolet ray. On account of the proximity of the eye no attempt was made to use these.

408 Woolworth Bldg.

## SOCIETY PROCEEDINGS

### MINNESOTA ACADEMY OF OPHTHALMOLOGY.

April 9, 1926.

DR. D. L. TILDERQUIST, Presiding.

#### Acute Retrobulbar Neuritis.

DR. JOHN F. FULTON presented a young lady, 25 years of age, who seemed to have a form of acute retrobulbar neuritis described by Nettleship, Foster Moore, Sir John Parsons and others, which is not traceable to any demonstrable cause.

The case was referred to Dr. Carl Drake for general examination, who reported all findings essentially normal including a negative Wassermann, except for a mass in the pelvis and a uterine discharge.

The patient reported that about ten days before coming to him, she noticed a black spot in the field of vision of the left eye which rapidly increased in size until the vision was completely lost in this eye. On examination the pupil contracted to light but contraction was not maintained for the normal length of time. Vision was reduced to perception of hand movements. The function of the papillomacular bundle of the optic nerve was completely suspended. Some days she is able to count fingers by the nasal side of the

retina. The case is somewhat complicated by the fact that the eye has been amblyopic since birth and for a time was slightly convergent. The ophthalmoscope showed about 3.50 D. of hyperopia. The retinal veins were very much engorged, the arteries very narrow, and the upper and nasal side of the disc deeply veiled, the remainder of the disc entirely congested. The physiologic cup was small and deep.

The patient suffered a sharp pain in moving the eye, and considerable tenderness is manifested back of the eyeball, elicited by pressing the eye backwards. She also complains of considerable neuralgic pain and some headache.

It is interesting to note that Parsons, in a masterly paper read in this country a few years ago upon this same subject, refers to the importance of diagnosing this disease in cases where we have amblyopia associated with refraction trouble.

The roentgen ray examination of the teeth showed the patient to have a mouth full of perfectly sound ones. Her sinuses were clear, the nasal mucosa perfectly healthy, and the tonsils normal. There was no evidence of multiple sclerosis.

A careful study of the case reveals no possible cause except that pointed

out by Dr. Drake of a possible septic focus in the pelvis. In this class of cases, in which the etiologic factor is nondiscoverable, Parsons recommends mercury, iodides, salicylates and diaphoresis. It is along this line that this patient is being treated.

The papillomacular bundle seems to be particularly susceptible to toxins notwithstanding the fact that its position in the center of the nerve gives it unusual protection.

Many writers think that on account of the close relation of the nerve and sinuses, sinusitis is the principle cause of optic neuritis, but I agree with Parsons in thinking this very much exaggerated. The French writers seem to be of the same opinion, saying that it is the exception rather than the rule for this disease to be produced by the extension of inflammation from the sinuses.

*Discussion.* DR. J. MCL. MORTON was interested in the anatomic relationship of the optic nerve to the ethmoid. He said Loeb had made some beautiful pictures indicating the variability in the size and position of the sinuses, the diseased ethmoids in some instances being so large as not alone to affect the nerve on the one side but even on the other side. Dr. Morton had long suspected that many cases of so-called "amblyopia ex anopsia" are to be explained by pathologic conditions of the adjacent sinuses.

In some cases the frontal and maxillary sinuses are easy to demonstrate by transillumination but it is very difficult to get positive characteristics from the deep sphenoidal sinuses. Dr. Morton said there might be no evidence manifest in this case to show that there were such an involvement, but there might, however, be such involvement.

DR. CARL LARSEN stated that in view of the negative findings, so far as etiology was concerned, and regardless of apparent negative nasal findings, he would explore the posterior ethmoidal cells and sphenoid. He had seen several such cases in which the results were very gratifying.

DR. W. W. LEWIS stated that Skillern of Philadelphia had recently written an article on this subject in which

he makes the statement that in his belief there are thousands of eyes annually sacrificed just on account of the tardiness of most men to open up the sphenoid and ethmoid. Dr. Lewis said that if he went suddenly blind he would want the sphenoid and ethmoid ruled out as a cause of the retrobulbar condition.

DR. JOHN BROWN said he had examined the fundi of this patient and that Dr. Fulton had not told very much of the picture inside the eye. It looked normal except for the retinal vessels. All of the retinal arteries were narrowed and very little blood flowed thru them. It seemed to Dr. Brown, from the fact that there was pain produced by lateral movement of the eye, pressure on the eye, and following excursion of the eye in all directions right or left, that there was some pressure or inflammation far back in the orbital space. It must be in the region very closely associated with the posterior sinuses. When he transilluminated the maxillary and ethmoidal sinuses, they were remarkably clear, but it is impossible to transilluminate the sphenoid sinus.

DR. MORTON wished to ask Dr. Fulton on what he based his diagnosis of retrobulbar neuritis in a patient so amblyopic as this one was now and always had been; a case in which visual field testing was entirely unsatisfactory.

DR. A. DEH. PRANGEN said one would have difficulty in deciding whether this case was one of retrobulbar neuritis or embolism of the central retinal artery. Examination of the fundus showed the arteries very much attenuated with the exception of the inferior nasal. Dr. Fulton had said that the field of vision was practically nil except for moving objects in the extreme temporal periphery. The size of the field defect would be more suggestive of embolism.

As to treatment of acute cases of retrobulbar neuritis, Dr. Prangen said that they had had very good success at the Mayo Clinic by using pilocarpin sweats; in addition to the usual eliminative measures. Many of their cases had made a good recovery.



DR. FULTON replying to Dr. Larsen and Dr. Lewis, said that many authorities, such as Janssen, and others, agree with them in claiming that the ethmoids should be operated on in these cases even if there were no positive evidence of disease; but there are a vast number of others who decline to take this ground inasmuch as there is a strong tendency for this trouble to disappear spontaneously.

DR. LARSEN said the fact that the patient had a tender eyeball with painful motion of the eye would make him feel that the indications were all the stronger for exposing the posterior sinuses.

DR. PRANGEN stated that it was a peculiar fact that in their experience at the Mayo Clinic in the past eight years, they had not seen a case of optic nerve difficulty which they could feel was due to sinus disease.

DR. MORTON said he was interested many years ago in the work of Katharine Marbreiter who went into the matter very thoroly, reporting some 170 or 180 cases that were very interesting. Dr. Morton said that of course she may have been looking for trouble, but she found a large number, proportionately, of visual field manifestations with sinus complications in the posterior sinuses. Dr. Morton said he had seen quite a number of visual fields involved that had been so clearly due to sinus trouble that there was no remaining doubt in his mind that the involvements of the posterior sinuses are accompanied in certain cases with visual field manifestations.

DR. V. J. SCHWARTZ stated that he had been a little skeptical with regard to the relation between sinus disease and optic neuritis until a young lady presented herself with loss of vision in the right eye. In her history there was practically nothing that would account for her trouble. It was only after exhausting all ocular diagnostic methods that Dr. Schwartz undertook to examine the sinuses and found a low grade ethmoiditis on both sides. There was a well marked optic neuritis in the right eye. The vision in the other eye was good. He did not know what to do, but finally infracted the middle

turbinate and exenterated the ethmoids, and, much to his surprise, the optic neuritis disappeared. Dr. Schwartz said he still would have regarded this as a coincidence had she not developed an optic neuritis in the other eye. He repeated the operation on the other side and that eye cleared up too. The patient had a definite double optic neuritis on both sides but not at the same time and each cleared after drainage of the sinuses.

### **Ectopia Lentis.**

DR. GEORGE C. DITTMAN presented two cases of this condition.

CASE 1. V. M., aged 5, while playing with her brother, was shot in the left eye with a BB shot discharged from an air rifle. At the site of impact in the left superior quadrant of the cornea, a definite facet was evident; the anterior chamber was completely filled with blood. The eye was reddened but there was no evidence of pain. After a week's time, as the blood was absorbed, it became evident that there was a dislocated lens part of which presented in the anterior chamber. As time went on the lens became cloudy and whitened, and after three months the lens was absorbed.

As a result of the accident there remained a small coloboma about 2 mm. in diameter in the superior left quadrant of the iris, apparently due to the pressure from the lens. There was atrophy in this part.

The treatment given was atropin instillations, dionin and hot packs.

CASE 2. J. B., aged 60, while chopping wood was struck by a chunk which flew up and struck him on the right malar bone below the right eye. He felt the usual pain associated with a blow in that region, but the eye did not pain nor was it blackened as might be expected.

When first seen in March, 1926, he stated that he came because he could not see with the right eye as he formerly could and there was pain over the right frontal region and in the eye. On examination, the pupil was dilated and did not react to light. The iris was tremulous. With the ophthalmoscope the lens could be seen in the

right inferior quadrant apparently fixed in the vitreous. Placing the head in various positions did not cause the lens to move. A diagnosis of glaucoma due to a dislocated lens was made.

The treatment instituted was eserine drops three times a day and hot packs at night. Under this treatment the pupil contracted to normal size but the lens could no longer be seen as the iris completely covered it. The patient has been advised to use eserine once a day and to report at intervals.

*Discussion.* DR. JOHN BROWN said that the first case with dislocated lens in a child where the cataract was undergoing absorption was best left alone. The atrophy Dr. Dittman spoke of was probably due to trauma at the time of injury.

DR. DITTMAN said that after dilatation with atropin the lens fell back into the vitreous.

DR. V. J. SCHWARTZ stated that he and Dr. Pratt had seen at the General Hospital a case similar to this of Dr. Dittman's. The patient, a man about 60 years of age, had a similarly situated dislocation. The lens was cataractous and encroached upon the pupil, pushing the iris forward, so it was decided to make an ordinary cataract incision and attempt to remove the lens by the more or less hazardous method of the loop. They had no difficulty in getting posterior to the lens and it was lifted out without loss of vitreous and the wound healed promptly. The man has very fair vision and his only trouble now is a minor one: the lens had pressed the iris forward for so long a time that the iris is pushed a little toward the cornea, but it is not adherent.

DR. CARL G. SWENDSEEN gave a talk on "Clinical Vienna in 1926."

W. E. CAMP, M.D., Recorder.

## COLORADO OPHTHALMOLOGICAL SOCIETY

April 10, 1926

DR. GEORGE F. LIBBY, Presiding.

### Retinitis Proliferans.

DR. W. A. SEDWICK showed Mrs. H. R., nurse, 33 years of age, whose

general health has always been good. She has one healthy child, otherwise her marital history is negative. Family and past history not important. Physical examination was negative.

She was seen first on July 25, 1925, with the following history. While handling an insane patient she was kicked in the left eye. No pain was felt but a few minutes later could see cobwebs before the eye. On examination V. O. D. = 15/20; V. O. S. = shadows, tension normal. The left pupil was dilated with homatropin but only a deep red reflex was seen. A diagnosis of hemorrhage into the vitreous was made. One week later sufficient absorption had taken place so that the larger vessels and disc were seen indistinctly. V. O. S. = 15/200.

The patient did not return again until December 3, 1925. The left fundus now showed a long white streak resembling a rupture of the choroid, extending from high up and slightly temporalward down and thru the disc and below it to the periphery and ending in a rather large patch of old choroiditis. The right fundus at this time revealed a more striking picture than the left; a large white streak was seen running from above downward just beside the disc and ending in a patch of choroiditis. Just below the disc was a branch running upward and nasally. Vision with correcting lenses was now O. D. 10/13, O. S. 15/20. A probable diagnosis of retinitis proliferans was made.

*Discussion.* DR. C. E. WALKER thought that because the fundus picture of the two eyes was so similar, the injury had no bearing on the conditions as seen at present.

DR. WM. H. CRISP said the picture was characteristic of retinitis proliferans and unusual in that the eyes show symmetric changes.

DR. EDWARD JACKSON looked only at the right eye and diagnosed retinitis proliferans. He knew of several cases reported which occurred after repeated hemorrhages, with good vision finally.

DR. GEO. F. LIBBY was struck by the absolutely straight appearance of the bands.

**Iritis.**

DRS. WM. C. BANE and WM. M. BANE exhibited Mr. L. R., aged 54, who was first seen April 8th, 1926, complaining of soreness of the right eye of four days duration. There was no secretion. Following an attack of pneumonia 17 years ago, and of influenza five years ago the right eye became painful and inflamed. On examination there was noted a superficial scar in the upper temporal quadrant; the lower nasal quadrant was markedly infiltrated. There was moderate congestion of the marginal vessels and the pupil dilated fully with homatropin. The left eye was normal. The teeth were in bad condition and on April 9th, two of them were pulled. The appearance of the right eye on this date was unchanged, but the tension was found to be 33 mm. Hg. and eserine was instilled. On April 10th the tension was the same and pilocarpin 1 per cent t. i. d. was ordered.

*Discussion.* DR. E. R. NEEPER believed the eye manifestations were due to focal infection and he would use atropin in spite of the slight rise in tension.

DR. WM. H. CRISP said that he has seen several cases in which atropin had been avoided because the tension was above normal. He keeps such a patient in the office several hours and uses homatropin frequently. If such treatment proves grateful he orders homatropin 1 to 60 for home use every hour, with instructions for him to be notified at once if there is any pain. The following day atropin is used provided conditions are favorable. He wondered whether or not sensitiveness of the cornea might cause a slight rise in tension.

DR. WM. M. BANE replied that in this case the cornea was not sensitive.

**Partial Paralysis of Accommodation Following Mumps.**

DR. WM. H. CRISP reported a case of partial paralysis of accommodation and of pupillary contraction after mumps. The patient was a girl of nine years who had recently been given a refractive correction for compound hyperopic astigmatism of moderate amount.

The patient came in complaining of poor vision in the left eye and dilation of the left pupil. There had been no drugs used in the eyes since the instillation of homatropin more than three weeks previously. The vision with correction was found to be right and left 20/16, but without correction the vision of the left eye was only 20/24. The right pupil contracted to light, but the left did not. The near point with the glasses was right 4 D., left 2 D., altho previously 10 D. of accommodation had been recorded. The patient was out for the first time after a very severe attack of mumps. Pilocarpin 1:120 was ordered for use once daily in the right eye and three times daily in the left. Three days later the near point of both eyes, with the glasses, was 6 D., the right being slightly better than the left. The frequency of administration of the pilocarpin was reduced to every second night in the right and every night in the left eye. After another three days the near point with the glasses was 5 D. or so, and the pilocarpin was discontinued. A month later the accommodation was 5.5 D. The patient had not been seen since.

**A Case of Unilateral Convergent Strabismus.**

DR. WM. H. CRISP reported a case of unilateral convergent strabismus definitely noticeable before the age of five months. The child, plump, active, and seemingly healthy, had lost one pound in the course of the next two months. At the age of seven months each eye had 6 D. of hyperopia with approximately 1 D. of hyperopic astigmatism with the rule.

**Sympathetic Ophthalmitis.**

DR. EDWARD JACKSON and DR. WILLIAM C. FINNOFF reported R. O., age 12, who was struck in the right eye with a staple on February 1, 1926. At the end of two weeks, during which time the eye was inflamed and painful, the boy was taken to an oculist who found three cilia deposited in the anterior chamber. He made a keratome incision above and removed two of them. The patient returned to his home which was in a remote rural section.



Fifty-one days from the date of the injury, he came to Denver and on examination the following findings were noted: O. S. Intense ciliary injection; there was a cilium which was covered with exudate, extending downward from a corneal scar to the level of the lower limbus. The 3 mm. horizontal corneal scar occupied the center of the cornea; above at the limbal margin was the healed keratome incision. There was also a small iridectomy above. The pupil margin of the iris was bound down to the lens capsule, and the iris vessels were markedly congested.

O. D. There was mild circumcorneal injection. Numerous cell deposits were evident on the posterior surface of the cornea. The iris vessels were markedly injected and between the pupil margin and lens capsule were several adhesions. The anterior chamber was filled with serofibrin and cells. The vision O. D. and O. S. was .02. Because of the advanced and apparently rather equal involvement of the both eyes it was decided to delay enucleation of the exciting eye until it could be definitely determined that ultimately it might not be the better seeing eye. Therefore, the boy was sent to the hospital, the cilium removed from the left eye without difficulty, and intensive treatment instituted.

After ten days observation, the left eye was enucleated. The vision on this day was O. S. 0.03, O. D. 0.4. Up to the present time the vision of the right eye has held. The iris vessels remain moderately injected, the vitreous is hazy and no fundus detail may be seen.

DONALD H. O'ROURKE, Secretary.

## BROOKLYN OPHTHALMOLOGICAL SOCIETY.

April 15, 1926.

DR. RALPH I. LLOYD, Presiding.

### Unilateral Orbital Cellulitis.

DR. JOHN BAILEY reported the case of S. T., aged 13, who was operated on June 30, 1925, for hypertrophied tonsils and adenoids. Three days later the right upper lid became puffy and in 48 hours the lower lid was involved. The swelling spread rapidly, so that in a short time the face, forehead, and

scalp were included. The diagnosis of erysipelas was made. One week after onset patient entered hospital with a temperature between 103° and 104° and intermittently irrational. The eyeball was fixed in the position of slight divergence and was proptosed about 1 cm. Roentgen ray unsatisfactory. Leucocyte count 13,600, polymorphonuclear leucocytes 76 per cent. On the eighth day the upper lid was freely incised and a rubber tube drain inserted. The recovery was rapid with no impairment of vision or motility.

### Bilateral Orbital Cellulitis.

DR. JOHN BAILEY reported the case of B. S., aged 25, who presented himself Jan. 1, 1926, with the history of redness at the left anterior naris of two days' duration. In three days the entire left side of the face became swollen and the following day the right side was also involved. A small pustule at the tip of the nose was opened at this time. The redness spread rapidly so that within a short time the entire face and scalp were included. He was sent to the hospital with the diagnosis of erysipelas. He was delirious, with temperature in the neighborhood of 104° and a leucocyte count of 14,800 with 84 per cent polys. Later he became totally blind. Three weeks after the onset the eyes were enormously swollen and showed horizontal ulcers due to lagophthalmos. The fundi were hazy and showed numerous hemorrhages. Both left and right upper lids were freely incised and later the sphenoid and ethmoid sinuses were exenterated. At the time of reporting there was still bilateral exophthalmos, the corneae showed healed ulcers, the motility was good and light perception uncertain. The discs showed postneuritic atrophy with very narrow vessels. The differential diagnosis between bilateral orbital cellulitis and cavernous sinus thrombosis rests on the signs and symptoms associated with the nervous system. In cavernous sinus thrombosis, a positive Kernig and Babinski are present and the spinal fluid is cloudy.

### Asteroid Hyalitis.

DR. JOHN BAILEY reported the case of S. S., aged 50, with history of cough of some years' duration with pulmo-



nary hemorrhages two and one half years ago and the presence of tubercle bacilli in the sputum at different times. Six months previous to the hemorrhage the sugar content of the urine was 7 per cent. For some time he had been complaining of black spots before the eyes with gradual visual impairment. At the time of examination the vision of the right eye was 1/200; left eye 8/200. The fundi showed hemorrhages of different sizes and shapes with areas of fibrous tissue extending into the vitreous. There were several areas of detachment in the right eye. The vitreous cavity of this eye contained many small spherical bodies, varying in size from the point of a pin to several times as large. The entire ophthalmoscopic picture can be explained on the basis of ocular tuberculosis. The differential diagnosis between this condition and synchysis scintillans is the following: in synchysis scintillans, the bodies are flat, mobile and upon the subject moving his eyes, there is a shower of golden glistening spangles falling to the bottom of the vitreous chamber, while in asteroid hyalitis the bodies are rounded, brilliant white and maintain a fixed position. In asteroid hyalitis the vision is usually greatly affected owing to the associated ocular pathology, while in synchysis scintillans the vision is usually unimpaired. In asteroid hyalitis there is usually involvement of only one eye.

#### **Siderosis of the Lens (Two Cases).**

DR. DAVID BISHOP reported the case of A. O., aged 14, who presented himself June 6, 1925, with the history that a month before, while scraping insulation from a piece of copper wire with a knife, something flew into his left eye. Since then the vision of the left eye has been impaired. Examination showed vision of right eye 20/200; left eye 10/200. The media of the right eye were clear, the lower margin of the disc blurred and swollen. The left eye showed a central corneal scar; also one in the anterior lens capsule. There were also diffuse lenticular opacities, the disc margins being blurred, especially at the lower border. The roentgen ray localized the foreign body and on June 11th the eye was ex-

posed to the action of a giant magnet. As there was no response a second attempt was made on the 16th. In the meantime a second roentgen ray had been taken showing the foreign body to be further back. The third roentgen ray, taken after the second exposure to the giant magnet, showed it to be in about the same position as in the original picture. It was, therefore, concluded that the second plotting was erroneous. Vision failed gradually and on June 23rd, it was, right eye 3/200; left eye 2/200. Both eyes showed optic neuritis, but laboratory examinations were negative. The left ethmoid sinus was cleaned out but this had no effect. October 6th, the left eye showed greenish discoloration of the iris and the anterior lens surface was covered with numerous fine brownish dots. Another roentgen ray was taken, and on March 13th, the sclera was opened in the lower temporal quadrant near the limbus and the foreign body extracted with the hand magnet. On April 7th, the vision of the right eye was 20/50; left eye, hand motion, projection normal.

The second case, L. A., aged 13, was first seen July 24, 1925. Mother noticed a film over the right eye ten days previously. The sight in this eye had been hazy for several months. Three years before, the boy had run his eye into a wire fence. Vision at time of examination: right eye, fingers at 6 inches; left eye 20/15. The right lens were completely clouded, the iris and pupil being normal. Dilated pupil showed numerous brownish spots on the anterior lens capsule. As they resembled rust spots the diagnosis of siderosis was made. The foreign body was localized and on August 1st, it was removed by the posterior route with the hand magnet. Later the lens showed some spontaneous absorption.

#### **Optochin Poisoning.**

DR. JOSEPH GOLDING reported the case of B. R., aged 21 months, who had been given 21 grains of pneumoquin in three days. Both pupils were widely dilated and did not react to light. The fundus, especially the vessels, were unusually red. Eliminative treatment and small doses of potassium iodid

were ordered. The following morning the pupils had contracted and later retracted to light. It could not be determined whether sight had been restored, as the child had a relapse and died on the 19th day.

#### Primary Sore of the Eyelid.

DR. WM. F. C. STEINBUGLER reported the case of an initial lesion of the upper left lid, which, in its incipiency, greatly resembled a hordeolum. Smears taken from the ulcer and examined for spirochetæ were negative. A positive Wassermann reaction was obtained and there was considerable adenopathy. Following several doses of salvarsan the condition had almost entirely cleared up.

#### Visual Field and Fundus in Endocrin Dysfunction.

DR. WM. D. ROWLAND read the above entitled paper which appeared in full in the March, 1926, number of the AMERICAN JOURNAL OF OPHTHALMOLOGY.

WM. F. C. STEINBUGLER, Sec'y.

#### KANSAS CITY EYE, EAR, NOSE AND THROAT SOCIETY.

April 16, 1926.

DR. J. W. MAY, Presiding.

#### Current Literature.

DR. E. E. PICKENS reviewed the ophthalmic literature for the past year. He thought that the greatest advances had been in Slit Lamp Microscopy.

Improvements also have been made in the medical treatment of cataracts by Dr. Davis of New York. He also mentioned a new hypothesis about glaucoma suggested by Dr. Verhoeff.

#### Penetrating Injury of Globe with Proapsed Iris.

DR. H. B. DAVIS presented a patient who had received a wound 15 mm. long involving the sclera and cornea below with a prelapse of the iris, in the corneal wound. The prolapsed iris had been excised and the wound covered by a conjunctival flap. The patient was given three injections of aolin and atropin was used in the eye. There was an uneventful recovery. Present vision was 20/65. The wound was

completely healed and the eye only slightly congested.

#### Congenital Ptosis.

DR. WM. KEITH presented a case of bilateral congenital ptosis, on which Dr. Woodruff of Joliet, Illinois, did a Mota's operation for ptosis on both eyes, a year ago. The patient then had motion of both upper lids and the pupils were both well exposed when at rest, and the patient was able to close both eyes with perfect ease.

ALBERT N. LEMOINE, Reporter.

#### COLLEGE OF PHYSICIANS OF PHILADELPHIA.

##### Section on Ophthalmology.

April 15, 1926.

DR. EDWARD A. SHUMWAY, CHAIRMAN.

#### Osteoma of the Orbit.

DR. E. B. MILLER exhibited a case of osteoma of the orbit, with the following history: C. F. J., aged 46, electric type worker by occupation, had always been well until July 7th, 1925, when he became nervous, had difficulty with speech and loss of memory. He was taken to the Frankford Hospital where he remained for two weeks; he gradually became better, recovered his memory and was taken to Atlantic City for five weeks. No other treatment was given. He was taken to the University of Pennsylvania and seen by Dr. Spiller, but not examined. He was later given a note to the Philadelphia Hospital, but when he saw the building, he said it looked like a prison and refused to enter. Following this he went to a physician for some trouble with his nose and was referred to the Polyclinic Hospital for roentgen ray study.

At the time that Dr. Miller saw him, he had not been working for some time because of a supposed nervous breakdown. While cutting up and laughing, he became suddenly blind in his left eye. For some time before this he had noted that his sense of smell and taste was considerably disturbed. He had been wearing glasses for work. O. D. + .37 sph. O. S. + .25 sph. C + .25 cyl. ax. 90 with + 1.00 sph. added for near. Vision without glasses was

20/20 in each eye. Fields taken by the hand method disclosed left homonymous hemianopsia. This was confirmed by a careful study on the campimeter. The right blind spot, studied on the Lloyd slate, was enlarged on the temporal side. External examination was entirely negative. Fundus examination showed oval, slightly filled-in discs, with narrow, slightly tortuous vessels.

On the right side of his head, in the temporal region was a bony tumor. The roentgen ray disclosed the continuation of this bony mass into the skull cavity. The mass itself was hollow, 8 cm. in diameter, almost filling the right temporal fossa. There was also a bony growth in the region of the sella.

Neurologic examination, and all laboratory tests were negative. He is left handed and his speech center is probably on the right side, which accounts for the speech disturbance.

*Discussion.* DR. EMORY HILL, considered this case especially interesting because of the significance of such bony tumors of the skull as recognized nowadays by the neurologic surgeons. He stated that several of them had been seen in Richmond, and it had been confidently expected to find an endothelioma beneath the bony mass. He said that this man, unless he proves an exception to the rule, will shew a large, but benign and encapsulated tumor which can be removed, with recovery from his disabilities. The ordinary excision of the bony tumor would be a very bloody procedure and useless because it would not reach the essential lesion; on the contrary, complete enucleation of the intracranial tumor, with adequate hemostasis as practiced by the neurosurgeon, will almost certainly effect cure.

#### **Obstruction of a Branch of a Retinal Artery.**

DR. WARREN S. REESE presented a case of this sort in a woman, aged 26, who, two years ago, had an attack of dizziness accompanied by marked reduction of vision in the right eye. This cleared up in a few seconds but a permanent defect in the right upper field remained. There was a second similar attack a year later following

which the eye returned to its former condition.

There is a loss of the entire right upper field extending almost down to fixation. The ophthalmoscope shows a marked reduction in caliber of the inferior temporal and nasal arteries in the right eye, and a perivascularitis along each of these vessels. Both these vessels come off the disc separately altho they diverge as tho coming from a common trunk.

The only significant thing in the general examination is that each of the above mentioned attacks was preceded by an infection. About a month previous to the first attack, the patient had a mouth infection and was told by her dentist that she had abscesses. Some time previous to the second attack the patient had quinsy.

#### **Complicated Cataract Following Injury.**

DR. WARREN S. REESE presented the case of a man, aged 30, who was struck in the right eye five weeks previously with a stone. The eye had been perfectly well before the accident.

The right eye shows a linear scar of the cornea up and out. Behind this is a rupture in the pupillary edge of the iris and a posterior synechia. Back of this are some streaky opacities such as one sees in a localized lens injury. In the cortex of the center of the lens is a star shaped opacity described by Fuchs as a complicated cataract.

The case is of interest from the standpoint of whether the cataract is really traumatic or (and this seems more likely) whether it is due to uveal disease induced or lighted up by the injury. The roentgen ray is negative.

#### **Todd Muscle Tuck With a Modification.**

DR. FRANK C. PARKER, in presenting a paper upon this subject, said that any resection of an ocular muscle is associated with a certain element of uncertainty unless the holding stitch is inserted thru the scleral tissue, the latter being split by the needle. This closely approaches the danger zone. Aside from this, should anything unforeseen occur and the muscle slip its stitch, conditions are necessarily complicated.

No stitch inserted into the conjunctiva or episcleral tissues alone can be



depended upon to hold a shortened muscle in situ. Such stitches invariably pull out in a few days and the effect of the operation is lost. Any further straightening of a squinting eye dependent upon the drawing together of the closing conjunctival sutures, may be disregarded in the final result.

Owing to the dangers associated with the scleral stitching, together with the necessity of removing a section of the muscle or tendon, the Todd tuck, with a modification, was selected. This requires no scleral stitching. No muscle or tendon is removed. Should anything unforeseen occur, the preoperative status is not impaired.

The modification consists of inserting the muscle tying stitch beneath the tucker arm instead of over the arm, and in a thoro removal of all fascia surrounding muscle and tendon for a distance of about sixteen millimeters by means of a cup shaped saw toothed curette. Also, the tucker arms have been changed to an angle of forty-five degrees and the closing conjunctival stitch has been altered, this latter, however, being considered unimportant and acting simply as a means of closing the wound and allowing the flat approximation of the tuck to the sclera.

A careful tenotomy of the opposing muscle is done before the tuck is made. This tenotomy should not be of the free, lashing order but confined strictly to the tendinous insertion and not beyond its limits. Small snips of the scissors opened for only a few millimeters are employed.

In doing this modified tuck, the only cut made is the original opening thru the conjunctiva and capsule. No further cutting is done to expose the muscle, this being accomplished by means of the closed blades of the scissors which are used to push back all tissue, giving a clean exposed muscle.

The writer, in ten years' use of this method, has never experienced an untoward result such as sloughing or other pathologic change. The operation seems to be perfectly safe.

In tying off the tuck, No. 1 plain gut is employed. Chromacized gut is inadvisable.

From photographs shown, the operation is capable of correcting the highest degrees of squint.

This modified tucking operation must be done with care and proper regard for the described technic in order to secure the desired result.

### Action of Atropin in Acute Inflammations of the Eye.

DR. FRANCIS HEED ADLER pointed out that the explanation of the action of atropin in acute inflammations of the eye, as given in text books, is that it paralyzes the endings of the third nerve and thereby puts the ciliary and sphincter muscles at rest—paralyzing accommodation and dilating the pupil.

The dilatation of the pupil is undoubtedly an important factor in the prevention of the formation of posterior synechia, but cases are often seen in which the formation of synechia is a rare occurrence and yet atropin is of decided benefit. This raises the question whether there is another action of atropin besides those enumerated. In some experiments previously published (*Archives of Ophthalmology*, vol. 14, 1925, p. 265) evidence was obtained which indicated that atropin had a direct effect on the ocular blood vessels, decreasing their permeability to protein molecules. If atropin has such an action, it would explain one of the effects of this drug in ocular inflammations, for one of the cardinal signs of any inflammatory process is a leakage of protein from blood vessels. Any drug which tends to prevent such a leakage will allay inflammation.

A series of experiments were devised to test this hypothesis. Dionin, subconjunctival injections of hypertonic salt solution, and oil of mustard were found to increase the protein content in cats' eyes. Quantitative determinations of the protein content were made in a series of eyes in which these drugs had been instilled, both with, and without, a previous atropinization of the eye. It was found that atropin definitely checked the increase in protein caused by these drugs, and the experiments were so controlled that the conclusion could be drawn that atropin did have a direct action on blood vessels, decreasing their permeability to protein. For methods and experimental data, the original article should be consulted.



*Discussion.* DR. H. MAXWELL LANGDON said that, according to Dr. Adler's findings, it would seem that in using both atropin and dionin in inflammatory diseases of the eye we are doing a contradictory thing, and yet I think it is common usage to do so, the atropin tending to lessen the formation of inflammatory products whereas the dionin would seem most surely to increase it. Would it not be better then, except in cases where there was severe pain, to withhold the dionin until later stages of such conditions?

DR. EDWARD A. SHUMWAY said that Dr. Adler's results, showing the effects of atropin on the blood vessels, and the reduction of the protein output, and the opposite effect of eserin, has a very practical value in the treatment of ulcers of the cornea, and other inflammatory conditions. Many of the members have probably seen hemorrhages from the iris into the anterior chamber, in secondary glaucoma, in old cases of iridocyclitis, following the use of eserin which aggravated the condition.

In some text books eserin was advised in ulcer of the cornea, when there was danger of perforation in the periphery, but this treatment had always seemed to him unwise, because of the increase in the hemorrhagic tendency, and atropin should be the better drug, in any ulcer, whatever its position.

#### **Sarcoma of the Choroid.**

DR. BURTON CHANCE reported two cases of small, round cell sarcoma of the choroid which had come under his observation, the only ones he had received, in the past ten years. The first was in a physician who, when seen, was in violent, fulminating glaucoma, and evidently profoundly affected systemically. The patient died after three years from wide spread involvement. The other, under observation at the same time, is alive and apparently in good health. In the first case there was orbital involvement, the orbit, however, could not be treated by radium until several weeks after enucleation. In the course of time, the orbit disease was presumably entirely arrested. The other not being a hospital patient, escaped all attention immediately after enucleation. He has re-

cently returned after three years, but, as his general health has been robust, no radiations were applied. See page 738.

*Discussion.* DR. EDWARD A. SHUMWAY said that he thought the type of cell of the tumor was of more importance than the presence of pigment in the production of metastasis. Round celled growths were more likely to spread rapidly than spindle cell types, or the endotheliomas.

#### **Chronic Frontal Sinusitis with Edema of Face and Fundus Changes.**

DR. G. ORAM RING reported a case of frontal sinusitis with suggestive ocular fundus changes.

Mrs. T., aged 58 years, was referred to him for operation March 21, 1922. Previous diagnosis, osteoma of the upper, inner angle of the right eye. This case showed a contrasting picture to one presented by Dr. Wm. C. Posey, a pioneer in the work in the present century.

The patient had a swelling in the inner, upper angle of the right orbital region, quiescent for nine months. This all changed in forty-eight hours to a fulminating edema of the upper face and all four eyelids. Temperature was 104°. Initial examination showed a circumscribed swelling of the upper, inner orbital region, the size of a hickory nut, extending to the inner third of the right upper orbital rim, and downward to the root of the nose. The fissure was about one-third normal. The eyeball was deflected down and out, and any effort at upward movement accentuated the divergence. Diplopia was present. Vision, 20/40. The nasal half of the nerve was blurred. The field was restricted on the temporal side. Moderate Van der Hoeve scotoma was present. Roentgen ray report of orbital lipoma with negative frontal sinus findings. Intranasal study showed a deflected septum, obscuring the middle turbinal and necessarily impairing frontal drainage. Sinus illumination negative. These examinations were made March 21st and 22nd, 1922. On March 23rd, forty-eight hours after the initial examination, the patient noticed increase of edema of the lids, associated with pain in the eyeball with flushing. Symptoms in-

creased in twenty-four hours, demanding immediate operation. The fulminating edema involving the entire upper face, completely closed all four eyelids and the swelling extended up on the forehead across the nose and down each cheek. Temperature 104°.

Dr. B. A. Randall, in consultation, advised immediate operation and believed there was involvement of the frontal sinus.

Following incision along the upper two-thirds of the orbital rim, a large amount of pus was found. Further examination revealed an opening into the frontal sinus filled with granulation tissue. This was curetted and an extensive gauze drain was inserted. The wound healed in two months.

Roentgen ray examination by Dr. W. F. Manges, May 27th, 1922, revealed no free pus in any accessory sinus.

The association of the writer with the case history narrated is the entirely simple one of merely opening, curetting and draining a diseased cavity, but it has rather a wider interest in that in its elaboration it overlaps the ocular, nasal, roentgen ray and anatomic group study.

Four years have elapsed and the patient has suffered no further trouble. Vision 6/7.5 full. Eye in a normal position.

Case history citation. 1. Rapidity of orbital swelling, quiescent for a long period and then assuming a dangerous aspect.

2. Emphasizing clinical, over roentgen ray, study.

3. Van der Hoeve scotoma, without any demonstrable evidence of disease of the posterior paranasal sinuses.

4. Preference of a simple surgical practice to a more elaborate nasal drainage route.

5. Suggesting early rhinologic examination, giving patients a chance for early submucous resection and draining frontal sinus by intranasal route.

*Discussion.* DR. B. ALEXANDER RANDALL said, "The admirable presentation of his case by Dr. Ring leaves little to be said with regard to it; so I will only endeavor to cast a side light upon the matter by citing a case of sinusitis

seen nearly forty years ago that has been, in my experience, unique. The clinical picture of one stage of his condition is here shown; while photographs of horizontal sections of the frozen head, which I made some years ago at the Wister Institute, may aid in presenting the anatomic relations of these paranasal sinuses to the eye, eyelids and orbit.

Richard C. aged 31, white, employed at League Island, came to me at the Episcopal Hospital in 1889, suffering with severe headaches of some four months standing, which had begun with a stuffy nose. He had been treated by advertising "Catarrh Specialists," but with increasing disability and suffering: when his eyes became involved, he had been told to consult an oculist. Ptosis almost closed his left eye, which was decidedly protruded but fairly covered by the brawny eyelids; there was little conjunctivitis; vision 6/12? in each, with P.P. 6 inches; there was chemosis, and upward deviation of the left eye and diplopia when the slightly dilated pupil was uncovered by lifting the rather rigid eyelid. Other ocular movements were poor, but without notable change as to the vertical diplopia present all the time when the eyes were open. The eyegrounds were nearly normal, although venous congestion was rather greater on the left. All specific history was denied; but iodid and bichlorid were given, with decided increase of his pain. Little seemed amiss in his nares, and consultation with Harrison Allen brought little light as to the exact seat of his trouble; although high scarification gave some relief. The diagnosis of sphenoid empyema seemed verified by a spontaneous gush of reddish mucus a little later, with marked and progressive relief.

The unique feature of the case was the successive paresis of each external muscle of each eye, beginning with the inferior rectus of the left, then the right, and involving in clockwise sequence each other rectus. The practically specific action of atropin on the accessory nasal sinuses had not then been grasped, nor the probing of the sphenoid openings or infundibulum; so the case was not treated, as

I would now hope successfully to do, with little delay. Neither grippe nor lues seemed to be assignable as the cause and the therapeutic test of the iodid making the condition decidedly worse, was much more convincing of the absence of syphilis than the emphatic denial of the patient as to any known exposure. The problem of the exact anatomic localization of the sinus involvement can be only hypothetically and variously explained. To Harrison Allen, as to me, it was an enigma as yet unanswered."

#### **Eyestrain as a Cause of Headache.**

DR. H. MAXWELL LANGDON read a paper upon this subject in which he said that if a study of the medical literature is made, occasional references will be found to the fact that in certain cases, ocular trouble had been found to be the cause of headache. This was not stated in any definite, conclusive way, however, until, in the August issue of the *Medical and Surgical Reporter*, 1874, S. Weir Mitchell, in a paper on the various causes of headache, included ocular strain. Apparently, this attracted very little attention, and it was not until nearly two years later, in April, 1876, to be exact, that another article of his published in the *American Journal of the Medical Sciences* was convincing enough to arouse general medical interest and, therefore, this month of April 1926, may be considered as the semicentennial of the publication of this important fact.

In the *American Journal*, Dr. Mitchell made the following definite statements: (1) That there are many headaches which are due to disorders of the refraction or accommodation apparatus of the eye. (2) That in these instances the brain symptom is often the most prominent and sometimes the sole prominent symptom of the eye troubles, and that while there may be no pain or sense of fatigue in the eye, the strain with which it is used may be interpreted solely by occipital or frontal headache. (3) That the long continuance of eye troubles may be the unsuspected source of insomnia, vertigo, nausea and general failing health. (4) That in many cases the eye trouble becomes suddenly mischievous owing to the failure of the

general health or to increased sensitiveness of the brain from moral and mental causes.

Anyone who has had much to do with ophthalmology or neurology I think will agree that these brief paragraphs contain the gist of our knowledge of eyestrain, and that the best any later writer could attempt to do would be to expand and illustrate them, but that little essential material was left to be added to them.

Since this brief, but complete paper, whole books have been written on the subject, much that was sound and sensible, and as much, if not more, that was silly. Writers, familiar to all who read this, made claims as to the terrible and wholesale troubles caused by eyestrain, that were so extravagant that the whole subject became almost ridiculous, and, indeed, was ridiculed by physicians not conversant with the facts. Some of these writers claimed so much that the whole subject was looked upon askance and accurate facts and statements disbelieved and disregarded.

In considering the subject, it must be kept in mind that we are working in that very flexible, fluid material of functional conditions where we have great variation not only in the powers of different individuals, but also great variance at different times and under different conditions in the powers of the same individual, and that, therefore, it is not like weighing or measuring some tangible thing. An error of refraction which will cause much discomfort of various sorts in one person will, in a subject with a more stable make-up, produce no symptoms worthy of notice. This to the uninitiated, is bound to be confusing and to throw a shadow of doubt over the whole matter.

Another reason for the skeptical attitude of some medical men is the inaccuracy of some refractions. One of the things most positively stated by Dr. Mitchell, and by Norris, Thomson, and Dyer, the ophthalmologists on whose work his observations were based, was the need of careful and accurate correction of the defects after the use of a cycloplegic; many ophthalmologists are today throwing away the results of this work in their



anxiety to gratify the haste of patients who naturally wish to avoid the annoyance of a cycloplegic; and some are pandering to this mistaken idea of the public in the fancied necessity, as one physician expressed it last summer, "to compete with optometrists." He was at once shown the error of his idea by a colleague who said he "did not compete with optometrists but tried to do much better work." When a man known as a leading ophthalmologist will make such a statement as that on the floor of a medical gathering, it is not to be wondered that lay people go astray in their ideas of the requirements of the situation. The long cycloplegia produced by atropin is quite unnecessary for anyone over fifteen or sixteen years of age—homatropin, properly used, to be followed by eserine, will accomplish the desired result with the loss of the use of the eyes for but one day, surely not a great length of time to enable one to reach a result, which, if accurate, will ordinarily serve for several years. Of course, the greatly desired drug is one which acts for half an hour after instillation, producing complete cycloplegia for that time and then has its effect vanish, but this seems far away at present.

Some there are who fancy themselves as refractionists who claim their work is quite accurate without a cycloplegic. The following three cases are suggested for the consideration of such—each having been carefully refracted, one by each of two ophthalmologists near home and one in a distant city—the ages are given and the lenses worn when first seen as well as the results under the action of a cycloplegic.

Case 1. Miss H. J.—Age, 19.

O.D. + 0.25 sph. with -0.50 cyl. ax. 90° V. = 5/5?

With homatropin: O.D. + 0.25 sph. with + 0.25 cyl. ax 180° V. = 5/4 partly. O. S. + 0.50 cyl. ax. 165 V. = 5/4 partly.

Not a great difference, but enough to stop her headache and discomfort which she had suffered, on near work, indeed she felt more comfortable without the old lenses. Both refractions were done within a year.

Case 2. Mr. G. C. T. Age, 21.

Headache and ocular tire—refrac-

tion done without cycloplegia three months previous to this examination.

Wearing—O. D. -1.25 cyl. ax. 180° V. = 5/5 partly. O. S. + 0.25 cyl. ax. 90° V. = 5/15.

With homatropin—O. D. + 0.50 sph. -2.25 cyl. ax. 5° V. 5/4 partly. O. S. + 0.50 sph. 1.00 cyl. ax. 180° V. = 5/4 partly.

Correction of the astigmatism stopped his discomfort.

Case 3. Miss A. G. F. Age, 42.

Blur and ache upon near work.

Wearing glasses prescribed six months previously. O. D. + 0.50 cyl. ax. 90° V. = 5/5. O. S. + 0.75 cyl. ax. 90° V. = 5/5.

With homatropin—O. D. + 1.25 sph. + 0.25 cyl. ax. 90° V. = 5/4 partly. O. S. + 1.00 sph. + 0.50 cyl. ax. 90° V. = 5/4 partly.

Prescribed less + 0.25 sph. with relief from discomfort.

Anyone can do this, it takes but a portion of a day as far as the patient's time is concerned and is accurate—then why not do it? Lenses, especially for the correction of astigmatism, are either correct or incorrect; if the latter, the patient will not be relieved and will waste time and money seeking for the cause of the discomfort. It is probable that almost all cases could be refracted satisfactorily without the use of a cycloplegic in the absence of astigmatism, but how are we to be positive as to the presence or absence of astigmatism until we have used a cycloplegic? Many cases will cover up a fairly high astigmatism and suffer as a result, as the following case shows:

Mrs. J. B., aged 22, had suffered from attacks of trifacial neuralgia which had been diagnosed as tic douloureux and for which an alcohol injection was decided upon, when it was suggested that it might be a reflex from ocular strain and that as yet the eye had not been examined. The ocular examination showed no change in structure, visual acuity in each eye slightly better than normal, near point consonant with her age and a good muscle balance. It was not believed that the eyes were at fault, but, as a precautionary measure, homatropin was instilled and the surprising amount of one diopter of hyperopic astigmatism was uncovered in each eye, the correction of which re-



lieved the symptoms for over a month when the patient reported a return of the symptoms. It was noticed that the frames were not those brought for inspection after the refraction, and it was found that she had not liked them and had the lenses placed in different frames by another optician, who had the cylinders about 15 degrees off axis—when this was corrected, there was again a disappearance of the discomfort.

Here was a case of ocular strain simulating a serious condition, which at times leads to radical operative procedures, and which probably could not have been accurately measured and corrected by any means other than the use of a cycloplegic. Was not the very short time given to make the examination well spent?

The men who did the work upon which Dr. Mitchell based his statements were all careful and accurate observers and made sure that their results were correct. In one case, of a man fifty-one years of age, atropin was used to determine his error as it was felt that the accommodation was too active for a proper manifest refraction. They took the trouble to impress upon their patients the need for painstaking care and to secure their cooperation, and, unless miracles are expected, their footsteps may be followed in these days of haste.

*Discussion.* DR. BURTON CHANCE said that we should feel much indebted to Dr. Langdon for reviving, in this Section, the subject of a deeper interest in eyestrain, and for his allusions to Weir Mitchell's solution of many of the complaints depending upon the need for spectacles. Without in any way lessening the respect for Weir Mitchell, he would speak for a fuller recognition of the labors of the early ophthalmologists of this city who founded what has been called the "Philadelphia School of Ophthalmology." It was in the course of the careful scientific study of individual cases, under their care, that Weir Mitchell's attention was called to the value of the correction of refraction defects, and thru which he was able to apply their results to the quieting of his nervous patients, and to the restoration of the health of many who

consulted him. He, in his helpfulness, turned to Dyer, Thomson, Norris, Harlan, and others; it was their patient and prolonged testing of the ocular deficiencies and the adjustment of spectacle lenses that brought about relief. Mitchell's papers served to broadcast the information and practice of these pioneers in refraction at a time when their endeavors and competent observations were denied the credence they so well deserved.

It was of interest for him to recount that today, while rearranging on his shelves the personal case books of Dr. Wm. Thomson, which he possesses, he saw in the records of 1871 the notes of certain baffling cases whose health had been restored by the adjustment of cylindrical glasses of low measures, and of Thomson's early consultations with Weir Mitchell. It was of further interest to observe that most of the refraction records relate to myopes and presbyopes; but towards the end of the book for that year there came the first of interest to us in the aspect we are now considering. It was that of a young lady who regularly passed sleepless nights whenever she attempted to read or perform other close occupations in the evening while her family and their friends were gathered close together in the poorly gas lighted sitting room of her home, the atmosphere made still more hazy by the thick smoke from the men's tobacco. This lady's relief when she wore cylindrical glasses was indeed remarkable.

DR. McCLUNEY RADCLIFFE said "I congratulate Dr. Langdon on his timely and practical paper and on his insistence on a careful and methodic refraction under full effect of a mydriatic. I have always been opposed to the so-called quick or "one hour" use of a mydriatic as I am convinced that an accurate estimation of refractive errors cannot be determined in that manner.

While it is possible to paralyze the accommodation in that length of time, it is not possible to rest a tired eye with a retina fatigued and irritated by overuse, or by uncorrected, or improperly corrected refractive errors. I fear we frequently overlook this important factor in our refraction and it is especially true of low errors in highly sensitive eyes which are the most

difficult to test. We are all familiar with the improved vision on the second test where the eyes have had at least twenty-four hours rest under a mydriatic.

Recently, I had a case which illustrates the necessity of a complete and moderately prolonged mydriatic action. An active business man of thirty-nine years, using his eyes for close work was wearing: right  $-0.50$  cyl. ax.  $15^\circ$ ; left,  $-0.37$  cyl. ax.  $180^\circ$ . He complained of tired eyes and frequent attacks of frontal headache. He was examined by a skillful oculist, but, unfortunately, he did it in the quick way, only using homatropin for one hour. After I had continued the homatropin for twenty-four hours, my result was: right,  $+0.50$  cyl. ax.  $105^\circ$ ; left,  $+0.25$  cyl. ax.  $90^\circ$ . Since wearing that correction his headaches have entirely disappeared and he is using his eyes with comfort.

I find that patients are perfectly willing to take the time for thoro refraction when the necessity for it is fully explained to them."

DR. EDWARD SHUMWAY said he had seen prolonged mydriasis after homatropin had been prescribed, but this had been due to a drug wrongly labeled by the manufacturing chemist, and he thought that in a case cited by Dr. Buchanan this error had occurred, and hyoscyamin or one of its isomeric preparations had been used in place of homatropin

LEIGHTON F. APPLEMAN,  
Clerk.

### THE MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

June 8, 1926.

DR. LOUIS LEVY, Presided.

#### Arteriovenous Aneurysm with Pulsating Exophthalmos.

DR. M. B. SELIGSTEIN presented the case of L. J. S., colored, aged 61, who first presented herself at the O. P. D., June 1, 1926, complaining that the left eye had been swollen for the past five weeks. Previous history: In February 1926, she fell off the porch on the left side of her face and arm. The left arm was hurt and she had a headache

for two or three days after the fall. There was a marked pulsation on the right side of neck which she had noticed since the fall.

**External Examination:** Marked exophthalmos. The eyeball was distended and there was prolapse of conjunctiva of the lower lid. Fundus examination: Media clear. Disc hyperemic. Vessels blurred in places and tortuous. Ear, nose, and throat examination negative. Wassermann not yet heard from. Roentgen ray report: Sinuses and orbit negative except increased density in orbital region.

**Tentative Diagnosis:** Postorbital tumor with pressure on orbit. Patient was later seen by Dr. Phil Lewis, who made the above diagnosis, and due credit is hereby given him. There is a decided bruit both felt with the fingers and heard with the stethoscope over both the orbits and frontal region.

**Discussion.** DR. J. J. SHEA quoted Dr. Harkness' apparatus for pressure on the neck. Advised ligation of common carotid artery.

DR. P. M. LEWIS said that the condition is very rare. Dr. Ben Witt Key of New York had a case of the kind in which he ligated the ophthalmic veins and used pressure dressing.

#### Hypophyseal Tumor.

DR. P. M. LEWIS reported the case of J. Y., colored, male, aged 38, who was seen first on Feb. 8, 1926. Occupation well driller. Complaint: Failing vision of both eyes, especially the right. History: He first noticed sight failing in right eye about two years ago and it had gradually become almost blind. Sight of the left eye began to fail six months ago and had become quite bad. Headache was occasional and mostly in the frontal and temporal regions. He could see better at night than in the day time.

**Examination:** Lids, conjunctivae and corneae were normal. The pupils were normal, equal, slightly dilated, but reacted to both light and accommodation. The irides were normal. Tension normal to palpation. There was no muscular paralysis or imbalance. Sensation of the corneae and skin normal. The media were perfectly clear. The retina and its vessels were normal in appearance. The papillae were nor-

mal except for a temporal pallor, which was slight in the left eye and very definite in the right. Vision O. D. fingers at 4 ft., O. S. 20/100. The vision could be improved by lenses. The fields were taken by confrontation and a loss of the temporal field of the right eye was found. A tumor or lesion in the region of the optic chiasm was suspected. Roentgen ray of the sella turcica and the nasal sinuses were made. He was told to return the following day for study of the fields and blind spots, but did not return until February 23rd. On this date the fields showed a temporal hemianopsia of the right eye for form and colors. Green was not recognized at all, so blue and red test objects were used. The field for form of the left eye was only slightly contracted but there was temporal hemianopsia for colors. (Fields shown.)

The patient thus had a bitemporal hemianopsia for colors and a temporal hemianopsia, for form also, of the right eye. The report from the roentgen ray department of the Memphis General Hospital was as follows: "Nasal sinuses all well developed and clear. The sella turcica enlarged and showed a definite erosion of its floor. The clinoid processes seemed to be destroyed." It was impossible to obtain any outline of the blind spots. A diagnosis was made of an hypophyseal tumor, with a descending optic atrophy.

**Treatment and Progress:** The Wassermann test was negative. The serious nature of the condition was explained to the patient and operation was advised. He was referred on February 26th, to the attending neurologic surgeon of the Memphis General Hospital who confirmed the above findings and advised immediate operation. The patient absolutely refused to submit to operation, saying he had rather go blind or die than be operated upon. Potassium iodid grs. 15, three times daily, was prescribed and deep roentgen ray treatment was given at the roentgen ray department of the Memphis General Hospital. These exposures were given once a week. On March 22nd his condition was about the same. Vision and fields were just

as before. The papillae appeared more atrophied however. He still refused operative interference, altho he was told that nothing else would be of any value. The patient was not seen again, but on April 10, 1926, it was learned that he had applied for treatment at the Veterans Hospital.

#### **Corneal Tattooing by a New Method.**

DR. E. C. ELLETT reported the case of a patient upon whom he had practiced a method described by Knapp of Basle at the meeting of the Swiss Ophthalmological Society in 1925, and consisting in applying a tampon wet with a neutral solution of chlorid of gold to the area of the cornea which it is desired to stain, and which is first denuded of its epithelium. The application in this case was quite painful, but the result was a smooth, evenly stained area almost black.

**Discussion.** DR. D. H. ANTHONY said this method offered the patient more than any other.

DR. A. C. LEWIS objected to the pain of the procedure but approved of the results.

P. M. LEWIS,  
Secretary.

### **ROYAL SOCIETY OF MEDICINE.**

#### **Section on Ophthalmology.**

June 11, 1926.

SIR ARNOLD LAWSON, Chairman.

#### **Familial Atrophic Choroiditis.**

MR. J. COLE MARSHALL exhibited three cases of familial atrophic choroiditis, two of the patients being brothers, the other a first cousin. The vision of the elder brother was rapidly getting worse, chiefly on account of the waxy atrophy of the nerve. In the lens were marked corpuscular cells. Vitreous opacities were present. A hemorrhage on the front of the disc cleared up rapidly. Wassermann was negative. The youngest of the three patients was aged 19; he was myopic, and his vision was somewhat poor. Opacities were evident in the lens, and patches of choroiditis were present and seemed to be active. There was no nightblindness in any of these patients.

#### **Exudation in Macula.**

MR. J. D. M. CARDELL showed a case for diagnosis. It was that of a painter,



aged 50, who said that three years ago his vision started to be affected, and had become progressively worse, so that now with the right eye he could do no more than count fingers at one meter distance and with the left eye at three-quarters of a meter. There was a white plaque at the disc and a hemorrhage in the region of the macula in both eyes. The question was whether the plaque was of exudative or hemorrhagic origin.

#### **Angioma of the Retina.**

MR. LINDSAY REA showed a case of bilateral angioma of the retina. There was central choroiditis in the right eye which, after healing, showed some large vessels running upward and outward. In the periphery was a large white area, which looked like but was not, a detachment of the retina. One similar case of which he knew, ended in glaucoma.

#### **Myopia.**

MR. RAYNER BATTEN showed illustrations of a series of cases of myopia.

#### **Visual Field in Atheroma of Retinal Vessels.**

MR. RANSOM PICKARD read a paper on this subject. He explained that in the series of cases forming the basis of the paper, only those having no serious affection of the media were included, and only patients who were reliable observers and had short time reactions. The abnormalities in the fields in the cases discussed might, therefore, fairly be claimed to be due to the abnormal vessels, not to any secondary lesions. Twenty-nine eyes were dealt with. In four patients only one eye was investigated because the fellow eye was seriously concerned with the effects of advanced atheroma. He divided the cases into three groups, according to the degree of field loss. He found no correspondence between the severity of the eye condition and the blood pressure, so that the classification rested mainly upon the fields, and partly on the ophthalmoscopic appearances.

Mr. Pickard went into the changes he found in great detail, and showed a large number of charts on the screen. His experience showed that atheroma in the retinal vessels, did not necessar-

ily accompany atheroma in other parts of the body. In all the cases there was concentric limitation of the visual fields; in most of them there was observed a general loss of acuity of vision over the whole field, the fixation point being least affected. None of these patients had the difficulty in finding their way about which people had with glaucoma, and small fields due to that. He discussed the relation of these visual changes with those which probably took place in the finer cerebral vessels, in atheroma; leading to defects of memory, volition, and the power to carry out desires.

*Discussion.* MR. R. FOSTER MOORE said he had not realized that sectoral loss was so rare as Mr. Pickard found it. The general loss he thought was usually due to a hemorrhage in the central retinal artery itself. He agreed as to the correspondence of retinal changes with subtle brain changes in atheroma, showing themselves in a slowing down of energy and inability to quickly carry out decisions formed.

MR. ERNEST CLARKE said the series of observations would have been even more valuable if the diastolic pressures had been taken and recorded. He thought it would be found that in all such cases the diastolic pressure was low, and that the blood did not adequately reach the capillaries.

DR. GORDON HOLMES said these cases reported by Mr. Pickard did not constitute a homogeneous group. It was very important that both eyes of patients should be taken and tested, under precisely similar conditions. In finding the response to graded stimuli—at which he had done a good deal of work with Dr. Henry Head—a very important factor was the psychologic, and it was found that it was difficult for people of 55 to 60 and over to concentrate sufficiently for their replies to be of value. Great care should be taken to guard against fatigue.

MR. PICKARD, in a brief reply, assured the meeting that he took every precaution against inducing fatigue in the patients, as he fully realized the importance of both that and of the psychologic factor. In any future investigation on the subject he promised to record the diastolic pressures.

H. DICKINSON, Reporter.



## TONOMETRY.

JAMES W. SMITH, M.D.

NEW YORK CITY.

The exact methods for measuring the intraocular pressure with the tonometer and by other methods are here stated, including the later progress in tonometry.

Clinically, tonometers are employed to record variations of intraocular pressure. Scientifically, an accurate reading of such pressure could only be determined by introducing a canula attached to a manometer into the anterior chamber or vitreous. (Wahlfers, Schiötz, McLean). From such experiments, the actual intraocular pressure within the human eye has been found, and the tonometers now in use have been calibrated from these readings. Actually, tonometers record only the impressibility of the cornea, but as changes in intraocular pressure are transmitted to all the structures of the eye, such record is accepted clinically as a measurement of intraocular pressure (M. Cohen).

Modern tonometry dates from 1905 when Professor Hy. Schiötz of Oslo, Norway, devised his metal tonometer. (Fig. 1.) The Following description of the use of the Schiötz tonometer.

### POSITION OF PATIENT.

The patient is placed on a padded operating table, with the head inclined slightly backward. Corneal anesthesia is produced with holocain 2% or butyn 2%, instilled twice at minute intervals. The eyes should be directed vertically at an angle permitting the greatest exposure of the palpebral fissure so that an instrument, applied in an upright position, forms the prolongation of the antero-posterior axis of the eye. A three inch cross mark on the ceiling is a good fixation object for a patient with fair visual acuity. In the absence of an assistant, for cases with poor vision, the hand of the patient held in front of the eye at arm's length, on the side of the eye not under examination, often suffices and stimulates the patient's cooperation. (Fig. 1.) Langehan recommends the use of a wooden stand consisting of a movable upright with a horizontal bar at the end of which a fixation object is placed.

The lids are retracted from the eyeball against the upper and lower bony

rim of the orbit by the thumb and index finger of the examiner's free hand exposing the greatest possible area of the cornea without exerting any pressure on the eyeball.

### APPLICATION OF THE TONOMETER.

Before using the Schiötz tonometer, the operator should test the position



Fig. 1.—Applying the tonometer to the cornea with its axis vertical. Showing proper position for the patient, and hands of the surgeon.

of the indicating needle by setting the instrument upon the convex model of the cornea. If the needle is directly over the zero to the left of the reading scale, it is then adjusted properly for use. Grasping the handles firmly, with the reading scale rotated towards the examiner, the plunger beneath the foot plate is applied gently to the cornea. For a correct reading, a tonometer must rest in a vertical position, as any inclination laterally, superiorly or inferiorly reduces its weight on the eye. A uniform rim of cornea uncovered by the foot plate is a good index of a vertical application. The measurement is commenced with a 5.5 gram weight. If the intraocular pressure of the patient be normal, a deflection of the indicating needle to the right is noted between the third and sixth mm. marking. If the tension be increased beyond normal, the indicating needle will fail to deflect to the right, may remain at zero or even point slightly to the left of zero. This means that a greater weight must be used to record the pressure accurately. A 7.5 gram weight is next applied, and if the deflection to the right extends to the 4th mm. marking only, the weight is still inadequate to record the increase of pressure. When the indicating needle is limited in its oscillations, between the 2nd and 4th mm. markings the reading gives the best result. A 10 gram and a 15 gram weight are supplied to record cases of great elevations in intraocular pressure.

Perfect coordination must be obtained between the examiner's eyes and fingers so that unnecessary and faulty readings are obviated. When these factors are controlled, each application should constitute a perfect reading. If doubts exist regarding the extent of needle deflection, the footplate may be removed several mm. from the cornea and reapplied to the eye for a second reading. An average of these two readings is usually taken as final.

#### TRANSLATION OF RESULTS.

Accompanying the tonometer is a graph where the abscissae indicate the deflection of the indicating needle and

the ordinates the height of intraocular pressure in millimeters of mercury.

#### CARE OF INSTRUMENT AND PATIENT.

After using, the small steel rod or plunger should be removed, and the channel of the base of the apparatus cleansed with alcohol and thoroly dried. Antiseptic solutions are contraindicated because incomplete drying may cause damage to the eyes of the next patient to be examined. The patient's eyes should be closed for several minutes after the examination and a small amount of borated vaseline may be applied to the conjunctiva to counteract the dryness produced by the anesthetic.

#### SCHIÖTZ'S CORRECTED GRAPH AND NEW MODEL.

In 1924 Professor Schiötz, following experiments of Priestley Smith and William McLean on pressure readings on human eyes in situ, published a new graph showing the results in mercurial pressure to be 4 mm. higher than the computations on the graph accompanying his original instrument. If the examiner records his findings in millimeters of deflection of the indicating needle together with the weight used (5.G; 7.5G; 10.G or 15.G) then the above fact will not affect the readings. However, if it is desired to translate the result of the tonometric reading into equivalents of mercury pressure, then the final result is 4 mm. higher than indicated on the old graph. The corrected graph was published in the *Acta Ophthalmologica* (Vol. II, Fasc. 1) and in the *British Journal of Ophthalmology* for April 1925 (Vol. IX, No. 4).

In the latest Schiötz model, it is only necessary to screw on the 5.5 gram weight, while other additional weights can be placed directly upon it if needed. This improvement eliminates the just criticism often directed to the trouble encountered in screwing on and off further weights for higher pressures. According to Schiötz, the sliding cylinder with the small round discs has been replaced by a cylinder with ballbearing, making the cylinder more solid and the tonometer better bal-

anced. The corrected graph is supplied with the new model. (American instrument dealers maintain that they cannot handle this model because of the prohibitive cost.) They are manufactured by A. Tandberg, Akersgaten, Oslo, Norway.

#### NORMAL INTRAOCULAR PRESSURES.

Wahlfors, in 1888, using a manometer in connection with a normal, living human eye found the intraocular pressure to be 26 mm. of mercury. Schiötz in 1905 reported the pressure to be 25 mm. of mercury in eight enucleated eyes. In 1924 Schiötz' corrected reading show that his previous reports were too low by 4 mm. and that the average, normal intraocular pressure is 29 mm. of mercury. A pressure of 26 mm. of mercury may be considered the minimum normal, and 33 mm. the maximum normal, using the Schiötz tonometer.

During the past eight years there has been a controversy as to whether absolute mercury equivalents can be deduced from tonometric records, when so few simultaneous manometric and tonometric measurements have been made on human eyes in situ. Priestley Smith and William McLean have lead in this work. Until these experiments have been studied more extensively it might be better to record the tonometric measurements in the form of a fraction, the numerator representing the weight used, and the denominator the amount of millimeter deflection on the scale, for example  $\frac{5.5 \text{ gram weight}}{3 \text{ mm.}}$ . Increased pres-

sure could then be indicated by the necessity for heavier weights or more limited deflection of the needle.

#### DIGITAL TONOMETRY.

Detection of intraocular pressure by digital palpation is the method used only when a tonometer is not available, altho it is still in vogue among older ophthalmologists. It has no comparative value, due to the variance of tactile sensibility in different examiners and the variations in lid thickness. Digital tonometry is recorded by plus or minus signs to indicate increased or subnormal tension, when  $T_n$  represents nor-

mal tension and  $T + \frac{1}{2}$ ,  $T + 1$ ,  $T + 2$ , and  $T + 3$  indicate increasing degrees of pressure. The degrees of subnormal pressure are recorded as  $T - \frac{1}{2}$ ,  $T - 1$ ,  $T - 2$ ,  $T - 3$ . At present this method is only of worth in glaucomatous cases showing considerable elevation of pressure, or in atrophic or phthisis bulbi eyes. To illustrate the

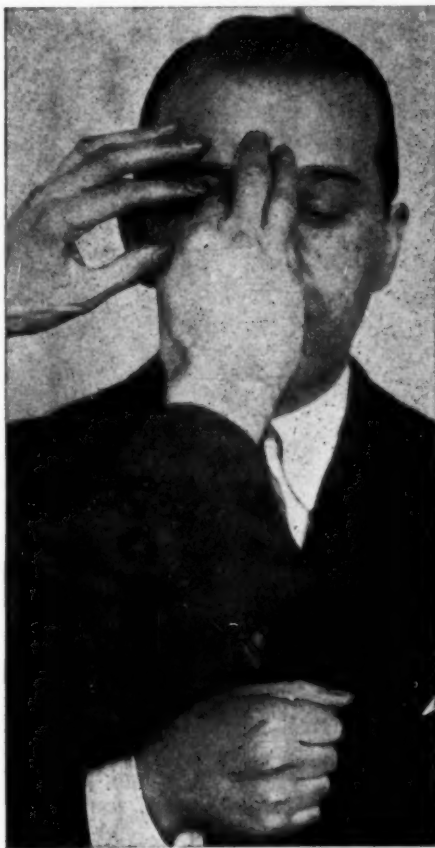


Fig. 2.—Digital palpation to test intraocular pressure. Position of patient and manner of applying fingers by the surgeon.

pressure in this method the patient is directed to look downward, head erect. (Fig. 2.) The eyes should not be closed, as described in some text books, as then the cornea and not the sclera, is palpated. To insure palpation over similar areas of both globes the patient should gaze at a fixation object, preferably the hand, held close to the waist. The examiner rests the middle and ring fingers of both hands on the patient's forehead and makes alternate pressure with the index fingers on the

lid over the anterior scleral zone. The ease with which the globe is dimpled or the resistance it offers to pressure determines the relative degree of decreased or increased intraocular tension. A comparison is made with the other eye, or if it be diseased, with the normal eye of some other individual. If the lids are greatly swollen the eyes can be anesthetized, the patient directed to look upward and direct palpation made on the lower anterior segment of the sclera without the intervention of the eyelids (J. E. Weeks).

#### PROGRESS OF TONOMETRY.

Harry S. Gradle in 1912 devised a modification of the Schiötz tonometer which has several advantages. It is constructed more firmly and the circular handles are more readily grasped and retained between the fingers. A freely movable stylet carries the weights and the vertical motion of the stylet is transmitted to the recording arm by a lever of the first class. Every third marking on the recording scale is numbered, which facilitates the tonometric reading. Three weights are supplied with the instrument each weighing one gram, and are readily applied to the stylet without screwing on. A chart is furnished which translates the tonometric readings into millimeters of mercury pressure, according to the empirical standard adopted by Schiötz.

Priestley Smith in 1915 set forth the merits of a modified Maklakow tonometer, but it was decidedly less sensitive as an index of corneal impressibility than the Schiötz or Gradle models.

William N. Souter in 1916 presented a direct registering tonometer, similar in size and shape to a fountain pen, which was constructed on the principle of a spring weighing scale. The examiner places himself to one side of the patient to obtain a profile view of the cornea. The instrument is then applied horizontally and enough pressure is exerted to cause dimpling of the center of the cornea. The plunger is of small diameter and strong illumination is necessary to determine accurately when enough dimpling has been in-

duced to warrant a reading. Souter recommends examinations by daylight with the patient sitting or standing near a window, altho an electric headlight may be used if daylight is not available. The direct reading scale is graduated in millimeters of mercury but no pressure greater than 75 mm. Hg. can be recorded. The originator admits that his tonometer cannot be used satisfactorily in the exact measurement of subnormal tension.

William McLean in 1918 devised a tonometer differing in many ways from those previously presented. The arc of the indicating needle is below, instead of above (Schiötz and Gradle models) so that the numbered reading scale is as close as possible to the eye under examination. A further advantage of the scale is that it is graduated in millimeters of mercurial pressure from zero to 100, making possible a direct intraocular pressure reading without recourse to graphs. The scale eliminates the difficulty of Schiötz's tonometer where millimeter or fractional millimeter oscillations must be noted. A plunger passes from the center of the corneal footplate vertically thru the barrel actuating the steel anvil at the upper part of the instrument. The indicating needle is suspended from the shaft of the anvil bearings. Obviously no weights are needed. Another advantage claimed for the McLean tonometer is that the plunger is so supported, "that no 'drag' is produced by the capillary attraction of any fluid which may have remained on the cornea at the time of placing the instrument for a reading." It is not generally known that the instrument can be disassembled altho this is rarely necessary.

There has been some hesitancy on the part of the profession in accepting this unique instrument because of the wide range of normal (22 to 40 mm. of Hg.) despite the fact that McLean's scale has been calibrated from manometric pressures determined on living human eyes in situ.

Martin Cohen in 1921, presented an ingenious instrument whereby a direct reading of the height of a mercury



column on a scale, similar in appearance to a thermometer, can be made. This tonometer utilizes a single weight of mercury, on the principle of a mercury manometer. "The mechanical adjustment of its various important parts, the plunger and the corneal footplate are controlled by the physical condition of the cornea and the intraocular pressure itself. The readings may be considered manometric in accuracy. The graduation of the scale was established according to the ratio of the area of the piston to the area of the bore of the capillary glass tube. The pressure of the mercury, combined with the weight of the piston and the plunger, produces dimpling of the cornea. The weight of the instrument is 44 grams, and it is so constructed that the pressure produced in the mercury reservoir by the rise of the mercury in the capillary glass tube, plus the weight of the plunger and piston, is accurately counterbalanced by the weight of the remaining portion of the instrument. The glass tube is accurately gauged and the bore is absolutely of the same diameter thruout.

The disadvantage of the Cohen mercury tonometer is its delicacy, that it must always be maintained in a vertical position, even when not in use, and that the loss of a small amount of mercury necessitates replacement and readjustment. The technic of its handling is more difficult than the Schiötz, Gradle or McLean tonometers.

Bailliant in 1923 introduced a tonometer with a special footplate which can be used vertically or in any

position desired. The instrument is constructed on the lever principle, as in the aneroid barometer. The Bailliant tonometer is rarely used by American ophthalmologists.

#### INDICATIONS FOR TONOMETRY.

Tonometry finds its greatest field of usefulness as an aid in the diagnosis of glaucoma, and as a guide in the medical treatment of this disease. The operative diagnosis of glaucoma should not be made with the tonometer alone without also considering the previous history, visual acuity, color and perimetric tests, examination of the anterior chamber (gonioscopy), and ophthalmoscopy. It is also used in the differential diagnosis of intraocular tumors and serous detachments of the retina and in differentiating glaucoma simplex with excavation of the optic nerve and primary optic nerve atrophy.

#### CHOICE OF INSTRUMENT.

Of the tonometers described above any one may be used provided that it has been manufactured according to the standards of its originator. Every ophthalmologist who employs a standard tonometer has learned to know from experience what the normal reading is for his instrument, and what constitutes an increased or decreased reading. The controversy regarding the calibration of some instruments, as compared to actual intraocular pressure reading obtained with a manometer, are chiefly of scientific and academic concern.

129 W. 86th Street.

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# American Journal of Ophthalmology

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## MAKING A VIRTUE OF NECESSITY.

An amusing example of special pleading is presented in an editorial in the Official Bulletin of the Illinois State Society of Optometrists and the Chicago Optometric Society, July 16, 1926, entitled "Arguments Against the Use of Drops in Eye Examinations." It would take up too much of our valuable space to reproduce the editorial *in toto*, but it consists, in substance, of a series of quotations from the works of Tscherning, Alger, Haab and de Schweinitz, Fuchs, Weeks, Posey and Wright, and Collins, with comments and deductions therefrom. Quoted without any statement as to their context, they are used as arguments against the use of cycloplegics in refraction.

Assuming that the quotations as they appear in the Bulletin are correct, they are for the most part statements of the facts, well known to ophthalmologists, that mydriatics and cycloplegics sometimes set up conjunctival irritations; and that they sometimes inaugurate attacks of acute glaucoma in eyes predisposed thereto. In addition, Tscherning states that there is an abuse of atropin in re-

fraction, and Alger says that a physician who has fallen into the habit of using a cycloplegic is utterly lost when it comes to the examination of an eye with the pupil small and the accommodation active, and thinks everyone must be equally at sea.

That the statements made above are true, with the probable exception of the last, cannot be denied. But the implied deduction, that therefore all eyes should be tested without a cycloplegic, is clearly a case of *non sequiter*; and the further implication, that optometrists are better refractionists than oculists, because the former do not use cycloplegics (N. B. the law does not permit them to) is equally fallacious. As a matter of fact, of course, some oculists invariably use cycloplegics, some never do, while the great majority use them when indicated.

If the use of cycloplegics is so frowned on by optometrists, why do so many of them seek to obtain the legal right to use them? Is it not true that one of the chief reasons why they are forbidden to use cycloplegics is this very danger of evoking a glaucomatous attack in predisposed eyes, a condition whose existence their training does not qualify them to detect? On the other hand, the extreme

rareness of cases of glaucoma so evoked proves that the training of men who use cycloplegics enables them to diagnose the dangerous condition, with the result that they refrain from the use of the cycloplegics in these particular eyes.

The editorial further states—"When eyes are examined under the use of drugs, different deductions are made from the prescription found in order to supply the wearer glasses that can be used. The deductions made vary with the individual practitioner; hence, no claim of accuracy can be truthfully made for this method." We take this to mean that the author of the editorial believes that oculists who use cycloplegics prescribe lenses based upon empirical deduction from the amount found by refracting under the cycloplegics. If so, he is greatly mistaken! It is possible that a few oculists do this, and what else can be done in children too young for a manifest refraction? But the overwhelming majority check their cycloplegic findings by a subsequent manifest, when the effects of the cycloplegic have disappeared, and base their prescription upon the data obtained from both methods—even to the extent of making no deductions when they agree exactly.

The optometrist seems to think that the only difference between the oculist and himself is the fact, that the former *may* use a cycloplegic, while he *may not*, which by some peculiar logic makes the nonuse of cycloplegics the preferable method. But the crux of the question lies deeper than this. *Vision is the resultant of the refraction of the eye plus the condition of the cornea, aqueous, lens, vitreous, retina, choroid, optic nerve and brain connections of the latter.* The optometrist focuses his attention on the refraction phase, and totally ignores the possibility of a pathologic condition being present. A patient comes to him complaining of headaches. He refracts him and prescribes glasses, which may even give standard vision. For him the case is finished.

But the patient, in addition to his refractive error, may have a beginning glaucoma simplex which early treat-

ment may abort. The optometrist has not the ophthalmologic training necessary for him to recognize the disease, and when the patient returns to him with subsequent headaches, can only make minute changes in his lenses. Meanwhile, the glaucoma is progressing. Or the patient has a nasal sinus condition. The optometrist has not the medical background to appreciate the fact that this or some other lesion may be complicating the refractive error present, so that much time is lost in changing lenses, while the main cause of the headache—the complicating lesion—remains untreated.

For every case of glaucoma evoked by the use of a cycloplegic, there are hundreds of cases of glaucoma simplex unrecognized by the optometrist! For every case of atropin conjunctivitis—which, after all, is fairly mild in its course and transient in its effects—there are hundreds of cases of suffering and disease, the true cause of which has been unrecognized by the optometrists who have prescribed glasses for the patients. For every case where the deduction following the cycloplegic test was incorrect, there are hundreds of cases where the optometrist prescribed concave lenses which were unnecessary or too strong, because he could not use a cycloplegic and thus ascertain the true refraction.

There are undoubtedly times when patients may receive comfortable and efficient glasses without the use of a cycloplegic, but it by no means follows that all or even the great majority of them will be so served—and to plume oneself because he does not do what he is not allowed to do, is certainly amusing. There is no desire to deny that many optometrists can do good refractive work within their limitations. But when they do not recognize these limitations, and seek to attain in a short time and by easy steps to the height to which others have climbed by slow and toilsome steps, it is time to call these limitations to their attention.

C. L.

### SIGHT SAVING CLASSES.

Every little while some new contribution is made to the cause of public health. What appears to be a measure of considerable importance is the foundation of the "Sight-Saving Classes." These are conducted for children of limited vision—those having so much sight that they should not be restricted to the instruction possible for the blind, and yet with insufficient vision to compete with the normal sighted child.

The rate of growth of this movement is illustrated by figures from "The News Letter" published by the National Committee for the Prevention of Blindness. At the close of the year 1924, there were 205 sight-saving classes in the United States, representing 15 states and 55 cities. During 1925 the number of classes was increased to 234. Since the beginning of the year, 8 new classes have been established, bringing the number on April 1, 1926, to 242, representing 15 states and 67 cities.

As a guide to those engaged in this work, Miss Estella Lawes has published a book "Methods of Teaching Sight-Saving Classes." This is published by the National Committee for the Prevention of Blindness. It is an excellent presentation of the subject and will be of great value.

The experience in one large city in which these classes have been tried for the past three years, is probably typical of other cities. The first difficulty was in getting pupils. The instruction of the physicians of the community as to the existence of the schools and the amount of vision essential to enrollment was the first step. This had to be repeated before the idea was sufficiently implanted to cause the physician to be on the alert for these children.

There was also a feeling of the parents to be combated. They associated these schools with institutions for the mentally defective and clung to the idea that some stigma attached to attendance on them.

A further difficulty was the conveyance of the pupils to and from the

classes. Obviously, in a large city with only one or two schools, some children had to go considerable distances. This drawback has been handled by that most efficient body of social service workers, in many cases one of the workers doing the conducting. The problem within the school to teach the different grades, many with only one or two in each, in this rather special type of instruction, is still being worked upon.

Taken all in all, these schools are reaching a continually increasing number and proving a more and more important factor in solving a difficult educational problem. L. T. P.

### A GOOD OPERATOR.

To be a good operator is the ambition of many young surgeons. But the attempt to become one, is not always guided by any clear conception of what is the highest skill of an operator, or what capacities and achievements must combine to constitute high surgical skill, or of how such skill may be developed and perfected.

Too often the idea of skilful operating is purely mechanical. To place a cut or a stitch exactly in the best position, with the greatest certainty and speed, is thought of as the goal of the practical surgeon. A good degree of skill in this direction he should possess, in common with the carpenter, the engraver, the tailor and the seamstress. His appreciation of relative position, distance, movement, resistance, should be cultivated like that of the hunter, or ball player. His sense of correlation of muscle action and result must be developed like that of the musician, or the glassblower. But these things, and all possible mechanical skill and exactness, do not make one a good operator.

The phrase "an operator, not a surgeon," is often used to designate one who has acquired the mechanical skill, to repeat on the human body what he has seen others do, and has himself learned to do on the cadaver. But such an one usually still lacks the highest operative skill. There is a certain difference between operating on a



dead animal's eye and on the functioning human organ; or between the living body and the cadaver. This difference exists even when the living body is brought to resemble the dead by profound general anesthesia. The reason for learning to operate is that the living organ or body may resume the activities of life in better, fuller measure.

The supreme issues that arise during an operation are those that relate to life after the operation. One cannot fit himself to meet these by any repetition of the operation on the dead eye, or by watching some one else do it on the living eye. An operation is a motor not a sensory achievement. It is learned by doing, and its higher perfection is reached, not by habit or repetition, but by making it a vehicle for the expression of living thought. Good operating does not consist in moving the knife a certain number of millimeters, at a certain angle, or in pushing the needle to just a certain depth. These may be necessary and important, but the essential thing is that every movement should be under constant control of the watchful eye, the developed touch, and the thinking well informed mind.

It is not the number of times you have done the operation, but the kind of thinking you do while you operate, the alertness to every condition that may arise, the readiness to meet it, that makes a good operator. Do you recognize when the eye rolls a fraction of a millimeter to the right or left, or up enough to change the inclination of your knife a few degrees while making your cataract incision, or while seizing the iris with the forceps? Consciousness of that sort of happening, and promptness in meeting it rightly, is what makes you a good operator; and it is secured by always thinking of what you are doing, not by making the same motions with a knife or forceps, any number of times.

The operations done mechanically, without thought of what is going on, diminish the higher operative skill rather than add to it. Large operative experience is of value in proportion to

the different situations encountered, recognized, and thought about until they are mastered. It is worthless, for those that have been passed unnoticed and unconsidered. Ten operations done in a month, and each of them carefully thought about before and after, as well as while operating, may give a hundred times more of the value of experience, than a thousand operations done in the same period, without time to think of any of the peculiar fine shades of difference that they may have presented. Value of operative experience lies wholly in the thought reactions awakened by it in the operator, and by the motor reactions put forward in response to the differences of situation perceived. It is these reactions leaving a permanent impression on the operator, and not the figures in the columns of a report, that count for operative skill.

Every operation should be a campaign, based on previous knowledge of such operations and a thoro study of the situation in that particular case, guided by constant watchfulness for the emergencies, great or small, that may arise during its course; and then thought over afterward, for the lessons that may be drawn from it for future application in similar cases and other campaigns. For purposes of acquiring operative skill the number of cases seen, or operated on, is about as significant as the number of books piled in the cellars of a junk dealer, or displayed on the shelves of the rich man's library, but never opened, are significant of the learning of their owners.

E. J.

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#### THE NEW OPHTHALMIC JOURNAL OF BUENOS AIRES.

The standing of the medical profession in South America is high in both men and material. It is understood that the medical course is eight years, thus restricting aspirants to the intelligensia who may have enough money, time and previous education to devote to it. On top of this, of course, comes the special education for ophthalmic practitioners.

The new ophthalmic magazine, *Archivos de Oftalmologia de Buenos Aires*, now in the 8th number of its first volume, contains articles giving light upon affections and phases of conditions that are not so common in the United States, and new ideas and methods well worthy of emulation and trial by its Northern neighbor.

The June issue contains four articles of merit. Dr. Leocadio Trigo writes on the influence of altitude on trachoma, showing that at 2,000 meters in Bolivia the altitude seems to be unfavorable to its development. Dr. Walter Meeroff treats trachoma by intravenous injections of ammoniated sulphate of copper with success, and ascribes the cure to the blood changes caused thereby. Dr. J. Lijo Pavia describes an epibulbar hematoma of long standing which was supposed to be a neoplasm before the operation. Dr. E. P. Fortin writes an able essay upon the fibers of Henle of the retina. Book reviews, notes on foreign publications, and a report of the Ophthalmological Society of Argentina complete the issue.

Published in the Spanish language, it is well printed. Welcome to our Family!

H. V. W.

#### NOTICE TO SUBSCRIBERS.

Those who contributed to the Jackson Birthday Volume intended that a copy thereof should be sent to each subscriber to the *AMERICAN JOURNAL OF OPHTHALMOLOGY*. It is found that some have not received such copies. All who have not received them are requested to promptly notify

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#### BOOK NOTICES.

*Semiologie Oculaire. Le Cristallin et son Appareil Suspenseur*, Felix Terrien. 240 pages, illustrated. Published by Masson et Cie, Editeurs, 120, Boulevard Saint-Germaine, Paris, 1926.

In reviewing the other books of this series, gratification has been sincerely expressed at the exhaustive and at the

same time clear language of the books. These works on Ocular Diagnosis would certainly bear translation into English and doubtless achieve a large circulation.

This one on the lens and its suspensory apparatus is perhaps the most complete work on the subject. The language is direct, to the point, much like that of high class American and English writers, and is really delightful reading for those who are conversant with French.

This book takes up the anatomy of the crystalline lens and the zonule; the suspensory ligament; the development of the crystalline, its structure as seen by the several methods of examination, its static stage and nutrition, its dynamic stage in accommodation; with a full discussion of the latter. Pathology of the lens and the suspensory ligament is then discussed under cataract, describing the senile, secondary, complicated and congenital types. Traumatic conditions, as contusions, luxations, penetrating bodies, injuries from electricity, from infrared light and traumatism, complicated by retained foreign bodies, are fully described. There are 158 illustrations in the text; the print and paper are very good. "Ca va sans dire"; this work is highly recommended.

H. V. W.

**Ophthalmic Section, Department of Public Health of Egypt.** Tenth Annual Report, 1922. Paper boards, quarto, 64 pages. Government Press, Cairo, 1926.

As published here all the statements in this report are anonymous. It is simply a Government document. The responsibility of the Government which supervises this service may well be accepted for the statistics and statements regarding hospital needs and finances. But for the clinical section it would be more satisfactory to have some way of understanding the view point, the personal equation back of the sections on glaucoma, cataract operations, influence of temperature on eye diseases, acute ophthalmia and membranous conjunctivitis.

The report is interesting for its statistics of blindness, and account of the

ophthalmic inspection and treatment at the Government primary schools. The hospital statistics are interesting from the sociologic rather than the medical point of view. A comparison of the statistics of one school for ten years shows a very satisfactory result of the system in which the compilation of statistics is "combined with an adequate system of treatment." At the Tanta Primary school were reported in 1913: Both corneas clear, 182 pupils; opacity of both corneas, 126. In 1923, the report shows both corneas clear, 512; opacity of both corneas, 25.

The hospital statistics, 19 pages, will be of interest to compare with similar statistics gathered elsewhere, to show the relative frequency of different forms of disease and the results of their treatment. Probably they have still greater value for comparison of forms of disease and results attained in different localities and under differing conditions in Egypt. These reports may be purchased thru book sellers, or from the Government Publication Office; Dawawin, P. O., Cairo.

E. J.

**Transactions Congress of American Physicians and Surgeons, Triennial Session, May, 1925.** Cloth, 140 pages. Published by the Congress. Walter R. Steiner, M.D., Secretary, 1926.

The meeting held at Washington last year was the 13th of the series. The members of this Congress are the members of the 16 special societies which combine to hold these meetings of which the American Ophthalmological Society organized in 1864 is the oldest. Once in three years these societies meet in Washington, each having its own officers, and carrying out its program in much the same way as at their separate meetings in the intermediate years. In addition to these separate meetings, general sessions of the Congress are held on two days; and for these programs are arranged by the Executive Committee, including discussion of subjects in which all the members are somewhat interested and a formal address by the President of the Congress.

This volume contains lists of officers and members of all the associated societies, and the program of the Congress sessions. Each of the individual societies publishes the transactions of its own meeting, in a volume such as it issues every year to record its scientific work. At the 1925 Congress, the President, Dr. William J. Mayo took for the subject of his address "Contributions of Pure Science to Progressive Medicine." The other sessions were devoted to consideration of the Ductless Glands. Dr. John J. Abel of Johns Hopkins took General Consideration in Respect to the Hormones. He took up the chemical explanation of endocrine diseases; the interaction of hormones, their dependence on chemical states and their chemical constitution. Prof. Charles R. Stockard of Cornell University Medical College, discussed "The Gonads and Sex Physiology," particularly the effects of the internal secretions of these organs, which are manifested only in vertebrates. Dr. W. B. Cannon of Harvard University spoke on "Some General Features of Endocrine Influence on Metabolism," especially regarding factors maintaining steady states in the body, particularly blood sugar balance and affecting protein equilibria.

Each of the last two papers is accompanied by an adequate list of references. The series is followed by the remarks in discussion of Dr. L. F. Barker of Baltimore and Dr. Harvey Cushing of Boston; which point out and emphasize the tendencies of this new science of endocrinology. Dr. Cushing begins thus: "It is an Irishism to say that the more one knows about a subject the less he knows; in other words, the more there is to know. To put it another way, the less he knows, the more he thinks he knows, and the more willing he is to express himself on the subject. I once thought I knew enough about the diseases of the pituitary body to write a book on the subject. I certainly would not venture to do so today."

Then he points out: "As our knowledge of the ductless glands has increased, the subject has gained such momentum that like an aeroplane it

has finally left the ground altogether to soar on therapeutic wings. But a surgeon of all people has no business to soar." Later the pleasure of speculating about what may be allures the speaker and he brings up sharply with this practical conclusion: "The surgeon's principal business, in matters hypophyseal, is seeing that the victims of pituitary adenomas so far as possible preserve their sight thru operative measures."

This little volume is worth reading by physicians specializing along widely divergent lines, since it offers a short cut to points of view from which one can survey the late advances in a rapidly developing field of medicine. Even its membership lists may be useful to one who has to advise patients whom to consult in distant parts of the country.

E. J.

**Pathology and Treatment of the Inflammatory Diseases of the Nasal Accessory Sinuses.** Prof. Dr. M. Hajek, University of Vienna. Translated and Edited by Joseph D. Heitger, A.B., M.D. of Louisville and French K. Hansel, M.D., M.S. of St. Louis. Cloth, two volumes, octavo, 718 pages, 7 plates and 186 illustrations in the text. St. Louis, C. V. Mosby Co., 1926.

The nasal accessory sinuses were for a time a sort of "No man's land," liable to incursions from the nose or pharynx, along the lacrimal passages from the orbit, or involved in major cranial surgery, suspected in headache, retrobulbar neuritis and recently in the many cases of possible focal infections. Hajek was a pioneer in giving systematic attention to this region and its disorders; and his lectures had made him famous before 1898, when he published the first edition of his work, covering the special anatomy, pathology and therapeutics. Two years ago this had reached its fifth German edition; and now it is made directly available to English readers.

The fame of this treatise is directly known to all rhinologists who have studied in Vienna, and its field of usefulness should be widely extended by this rendering in English. Its scope

is more inclusive than its title, a close translation of the German title, would seem to indicate. The "general part" 160 pages, deals with the Normal Anatomy of the Paranasal Sinuses, Pathogenesis, General Pathologic Anatomy, Symptoms and Diagnosis. The "special part" begins with Inflammation of the Maxillary Antrum and its Etiology, Pathologic Anatomy, Symptoms, Diagnosis and Therapy. These with 7 plates, reproductions of Roentgenograms illustrating the Anatomy of the Sinuses, complete the first volume.

The second volume is devoted chiefly to Inflammations of the Frontal Sinus, The Ethmoidal Labyrinth, and of the Sphenoid Sinus. Each is considered under the headings; etiology and pathologic anatomy, symptoms, diagnosis, and therapy. Then there are 10 pages on Combined Inflammatory Affections, and an appendix on Affections Associated with Ozena. There follows a discussion on complications in two parts: Complications Involving the Orbit and Visual Organs, 28 pages, and Cerebral Complications, 48 pages.

As a reference book this takes an important place on account of its 33 pages of references to the literature. One is not greatly surprised to observe that in a very large proportion the title of the paper referred to is in German, or the reference is given to a German publication. But this seems less remarkable, when it is realized that numerous papers by American or English authors have been published in German periodicals, either in full or in abstract. Many of these references might better have been to periodicals published in English in which the author's views had also been fully set forth. These would have been more appropriate in this translation, and would have called attention to sources more directly accessible to its readers. There is an excellent index of 14 pages, adding much to the ease and convenience of consulting the stores of information massed in this work. Even the oculist who does not treat diseases of the nasal accessory sinuses will find it worth while to make himself familiar with the aspect they present to the rhinologist.

E. J.



## CORRESPONDENCE

## Optic Canal in Sphenoidal Sinus.

*To the Editor:* In 1910 while examining specimens in the University Museum in the Department of Human Anatomy, at Oxford, England, a

The frontal sinus was overdeveloped, the roof of the orbit being double. The ethmoidal cells were reduced. The bony canal enclosing the optic nerve did not lie entirely free in the sphenoidal sinus, and in section would appear as in Fig. 2.

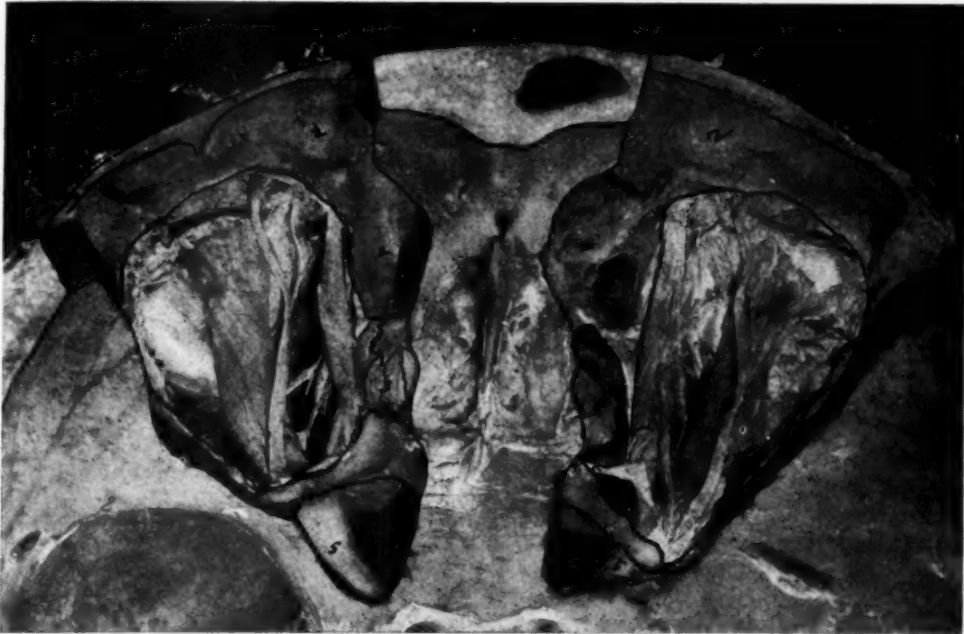
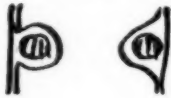


Fig. 1.—Photograph of base of skull with rough outline of sinuses. 1. Openings into frontal sinus. 2. Frontal sinus, R. and L. not communicating. 3. Ethmoidal cell. 4. Sphenoidal sinus. 5. Bony canal enclosing optic nerve, along outer wall of sphenoidal sinus.

specimen arrested my attention, for the elucidation of which I am indebted to the (then) Demonstrator of Anatomy, Mr. S. E. Whitnall. Mr. Arthur Thomson, the Professor of Anatomy

It is well to keep in mind the possibility of such an anomaly when operating on the sphenoidal sinus.

JOSEPH A. ANDREWS,  
Santa Barbara, California.



Left Right

Fig. 2.—Diagram of sections of bony canal enclosing optic nerves and continuous with outer wall of each sinus.

at the University, told me that no account of the specimen had been published, other than incidental reference to it in his article on the "bones," written for Cunningham's Anatomy. I am indebted to Mr. Whitnall for the photograph with the rough outline of the sinuses. Fig. 1.

## Affections of the Eye in Leprosy.

*To the Editor:* I have examined the eyes of 350 lepers in the Leper Asylum, Lau Simomo, near Brastagi, and about 200 lepers in the Leper Asylum, Pulu Si Tjanang near Beláwan Deli.

In the first asylum all the patients were Bataks, most of them belonging to the tribe of Karo-Bataks. In the second asylum the great majority of the lepers examined were Chinamen; who, before the discovery of their illness, worked as coolies on different estates.

Owing to certain circumstances I was obliged to confine my inquiry to

the externally visible parts of the eye. This inquiry led me to the following conclusions:

1. A very frequent symptom of leprosy is blepharochalasis of the upper eyelid.

2. Keratitis punctata superficialis is more frequently found in lepers than in healthy people, but whether this affection is a specific one is doubtful.

3. The most common affection in leprosy is iritis or iridocyclitis which in many cases heals up quite sufficiently without special treatment of the affected eye, leaving only some spots on the membrane of Descemet, or some pigment patches on the anterior surface of the lens capsule, sometimes together with posterior synechiae.

4. The eye is nearly always attacked by the bacillus leprae from the inside, along the blood vessels of the iris and the corpus ciliare and sometimes along those of the adjacent part of the sclera.

5. A propagation from the lepromata of the skin of the face to the bulbus oculi is an exception. Here I agree with the statement of Frank and Delbanco that "There exist no anat-

omic proofs for the theoretic supposition of an ectogen infection of this disease." I differ from Muir's statement: "While invasion from the front is the most common onset, it is maintained by some authorities that there may also be an invasion from the inside."

6. Total blindness is comparatively rare in leprosy. Blindness is caused mostly by a pannus leprosus, following scleroiridocyclitis. Sometimes it is caused by the destruction of the cornea and the inner parts of the eye, following ulcerative processes in the cornea. These processes are more frequent in lepers than in nonlepers, as the protective mechanism of the cornea may be defective owing to defects in the nerve supply in the eyelids, or owing to the loss of corneal reaction.

Whether blindness can be caused by atrophy of the optic nerve (as Unna supposes) cannot be denied *a priori*. I found, however, no case of blindness among my patients where this atrophy could possibly be considered as having caused the same.

B. M. VAN DRIEL,  
Medan, Sumatra.

## ABSTRACT DEPARTMENT

Reprints and journal articles to be abstracted should be sent to Dr. Lawrence T. Post, 520 Metropolitan Building, St. Louis, Mo. Only important papers will be used in this department, others of interest will be noticed in the Ophthalmic Year Book.

**van Heuven, J. A. Contribution to the Knowledge of Binocular Vision.** Doctorate thesis, Utrecht.

In the introduction, reference is made to the theories of nativism and empiricism as championed respectively by Helmholtz and Hering.

The author added an experimental confirmation of H. Snellen Jr.'s hypothesis that fusion originates from attention; an hypothesis which differs from the idea of identical retinal points, the horopter and the cyclopic eye of Hering. It is not an image pictured in the place of the object which is formed on the retina and is transported to the brain, but the light stimuli which affect the end organs of the optic nerve in the retina and so thru the optic nerve, cerebral paths and centers, make us observe immediately the object which has attracted our attention. The individual impressions are received by light sensitive elements of the retina and are conducted toward the higher centers. Thru these combined impressions, a complete image of the entire object is received from two different points.

The hypothesis of a more or less isolated process in the retina leads into great difficulties if it is used for explanation of the simultaneous perception with both eyes. On this basis it is hard to explain how consciousness can distinguish whether the information which it receives from the two eyes is related to the observation of one and the same object or to two specific objects.

In this hypothesis we are considering the two eyes as two entirely independent organs, whose cooperation must be considered as a logical sequence of the attention, altho these two organs are very closely connected with each other.

The author defines attention as that process thru which it is possible to take one specific from a large number of impressions, i. e. a concentrating of the consciousness on one distinct im-

pression which becomes located in the center of consciousness and is perceived with great distinctness while all others are secondary.

The author wanted to study the tendency for binocular vision and followed the method of changing at each test one distinct factor which influences the fusion, leaving all other circumstances the same.

The following conditions influence this fusion: 1. The strength of the prism, which is placed before one eye. 2. The fact that we concentrate or divert our attention. 3. The attention oscillations as are found with all sensual observations. 4. The strength of the stimulus which produces the fusion tendency. 5. The distance of the prism in front of the cornea.

He concludes that he has shown experimentally that the coordination of both eyes is a logical sequence to the attention as suggested by H. Snellen Jr. The test which concentrated and diverted attention illustrates it well. Attention, therefore, is the great factor which functions as a reflex acting regulation apparatus. It corrects under normal circumstances, all irregularities in the structure and function of our two eyes. It even does not bring into consciousness these imperfections and produces the impression that there always is present a splendid cooperation, a perfect symmetry. It is attention which makes us correct unconsciously, all deviations of the positions of the eyes, our heterophoria. As a rule and under normal circumstances, the eyes act together. This is natural when the stimulus affects the fovea centralis. If the image falls near but not on the fovea, the attention corrects this small deviation with resulting coordination. This happens with heterophoria. If the stimulus acts still more peripherally, then a stronger attention stimulus will be necessary to produce fusion. This happens with strabismus latens. The same tendency for coordination exists in strabismus paralyticus. Here

the stimuli act centrally strongly enough to produce a tendency to co-ordination of both eyes. When the paralysis of one ocular muscle prevents this, double images appear. If the stimulus acts still more peripherally or if the stimuli for both eyes are different, the tendency for coordination is absent. We cannot give attention to both stimuli at the same time and we cannot produce a logical entity. Consequently, one or the other image prevails. This happens during ophthalmoscopy and with strabismus alternans. The stimuli which act in the fovea are as different as possible; little tendency for coordination is present. The attention is given to the one or the other eye and so no double images are formed.

The impulse for coaction of our eyes "fusion tendency" is an attention question combined with expression of volition. We, therefore, adhere to H. Snellen Jr.'s standpoint, that when looking with both eyes at one object we see it single, not because we see it with identical retinal points, but because we observe the same object with different sense organs. If we are misinformed about the position of an object by one eye, as in looking thru a prism or with paresis of ocular muscles, then we see double.

E. E. B.

**Brown, Earle M. Color Acuity. Its Importance in the Early Diagnosis of the Diseases of the Conducting Paths and Centers and Diseases of the Neuroepithelium.** New Orleans Medical and Surgical Journal, 1926, April, vol. 78, no. 10, pp. 671-676.

The author makes a routine color acuity test upon all patients in conjunction with visual acuity tests as follows: After recording the amount of the manifest refraction, patients are required to determine the color of test objects placed six (6) meters in front of them in a good light.

If a red test object of 2 mm. and a green one of 5 mm. can be discerned, the color acuity for red and green is considered normal. A blue test object 7 mm. placed 15 cm. eccentric to the

point of fixation, if recognized, is considered normal. The color acuity threshold is determined by diminishing the distance between the patient and the test object, e. g., blue 5/6, red 4/6, etc.

When the color acuity threshold is below 6/6 for any of the colors, peripheral fields and central field studies are made.

Three cases with lowered color perception are reported. In each case there was a marked contraction of the visual field. An inflammation of the posterior sinuses was diagnosed. In the two cases which returned for operation, nasal operations were performed. A marked improvement resulted.

The author believes these cases would have escaped recognition except for the color test as the visual acuity was good and the eyegrounds approximately normal.

L. T. P.

**Rosenstein, A. Maria. Bilateral Obscurations of Sight with Transient Ophthalmoscopic Changes in a Case of Mitral Insufficiency.** Klin. M. f. Augenh., 1925, Sept.-Oct., 75, p. 357.

A man, aged 28, affected with compensated mitral insufficiency, suffered for eight years from bilateral obscurations of sight, sometimes three or four times a day, lasting up to 45 minutes without leaving permanent damage to the eyes. Rosenstein found in such an attack of 20 minutes, the picture of obstruction of the central retinal artery, however, without the red spot at the macula. The central vein was narrowed and all other vessels almost bloodless, the disc pale. Towards the end of the obscuration, the retinal vessels began to refill from the center. At the moment of return to normal appearance the patient commenced to see again.

The pupil was of medium size and immobile during the whole attack and not before two minutes after it did it again react to light and accommodation. During the obscuration the conjunctiva was white, and the pallor of face and neck and the staring look were as after death.



The author attributed the obscurations to a spastic ischemia of the retinal vessels descending from the cerebral vessels due to a central cause.

C. Z.

**Dear, Major W. R., Medical Corps, U. S. Army. Trachoma in Russia.** The Military Surgeon, 1926, June.

Of all European countries, Russia is most afflicted with trachoma. According to prewar statistics 3,000,000 persons in Russia were infected. The disease has had its most widespread dissemination in the territory of the Volga basin, with an area of greatest density in the Tartar Republic.

The physical conformation of the eye of the Chouvasch and Tartar is that of the Oriental, the angle between the lids being as acute as in the Chinese. This might be considered as a factor contributing to the greater prevalence amongst these nationalities, as once infection has occurred, drainage of secretions is hampered and spontaneous recovery without destructive ulceration of the cornea is rendered less likely than in the round eye of the Russian, whose lids normally open at a much wider angle.

In one section in a population of approximately one million, 75 percent were actually suffering with trachoma. In some localities the entire population had become infected. 8 to 10 percent are incapacitated from work because of partial blindness, and 1 percent are totally blind.

Most of the cases of blindness seen in Russia are the result of untreated trachoma. According to Professor Golovin, among 65,754 blind people in Russia, 22 percent had become blind as a result of trachoma, while Trouseau states that in Western Europe only 1.9 percent become blind as a result of this disease.

According to Chirkovski, in 1914 in Russian territory, with a population of 120,013,153, there were only 209 physicians specializing in ophthalmology and not over 1,670 treating diseases of the eye.

For years, the old Russian government and Russian society, appreciating

the urgent need of ameliorating these conditions, made a constant effort to increase and improve ophthalmologic hospitals and universities and paid particular attention to equipping physicians for ophthalmologic practice. During the period following the revolution and the years of civil war and economic upheaval, culminating in the Great Famine of 1921 and 1922, no constructive work was possible.

And what of Professor Chirkovski and the Trachoma Institute in Kazan, which we sponsored so enthusiastically? Has his great soul given up the struggle? And the thousands and thousands of untreated trachomatous Chouvashes in their poverty stricken little autonomous Soviet Republic along the south bank of the Volga?

The last I can answer: They are there: neglected, untreated, blundering along the dusty roads of Summer, blinking at the dazzling whiteness of the glittering snowy plains in Winter, or sitting patiently on the doorstep of the log house called home, and waiting—for what?—for the disease, trachoma, to gallop along its fiery path, searing, scarring and occluding until the course is run.

H. V. W.

**Shimkin, N. Trachoma in Palestine. Its Epidemiology and Measures for Dealing with It.** Brit. J. Ophth., 1926, May v. 10, No. 5.

This contribution is an exhaustive study of the trachoma situation in Palestine. It occupies thirty-three pages of text, tables, diagrams, charts and statistics, together with twenty references. The percentage of affected children both of the Hebrew and Arab is very high, the latter being rather higher, being accounted for by their very unhygienic surroundings. The Hadassah Medical Organization began, in various sections during the years 1918 to 1924, an active fight against the disease. Supervision and treatment of the school children has been instituted. Especial attention is given to prophylactic treatment. This is directed against the acute conjunctivitis so prevalent in this section during the summer months. During a

period of five years the incidence of trachoma has been reduced from 40.6% to 15.3%. In government schools it has fallen from 74% to 62%. Dealing with children has been found the best way of handling the trachoma problem in adults.

D. F. H.

**Oguchi. The Question of Acute Trachoma.** *Archiv. f. Ophthalmol.*, 1926, Band 117, p. 236.

There is much difference of opinion whether a true acute trachoma can exist. Many authors, especially those residing in a trachoma district, believe it does occur. Oguchi thinks that acute trachoma begins in one eye, more frequently occurs in the spring, affects men more than women and is most typical in adults. The smear with ocular secretion is usually free of bacteria, contains more lymphocytes than polymorphonuclear leucocytes, has plasma cells and lymphoblasts and shows an extraordinary number of histiocytes (probably large mononuclear leucocytes) and numerous Prowazek's or trachoma bodies in epithelial cells, histiocytes and free. There is a swelling of the preauricular lymph gland on the affected side. A diffuse cloudiness of the conjunctiva occurs due to cellular infiltration; this does not occur in follicular conjunctivitis. At the superior limbus, there frequently occur little infiltrations like phlyctenulae attended by many small blood vessels; sometimes such a change later turns into a pannus. Mild cases heal in several weeks, severe ones last a long time and finally result in scar formation. Silver nitrat is efficacious against it.

Acute trachoma must be differentiated from acute follicular conjunctivitis, gonoblennorrhea, inclusion blennorrhea and swimming pool conjunctivitis. Trachoma is a proliferative inflammation of the conjunctival tissue; the follicular conjunctivitis is a conjunctivitis occurring mostly in children of lymphatic constitution. The cells in the secretion from follicular conjunctivitis are lymphocytes, plasma cells and lymphoblasts; it never contains histiocytes or Prowazek's bodies. In inclusion conjunc-

tivitis and in bath conjunctivitis the size and shape of the Prowazek's bodies and the cytologic findings are the same as in acute trachoma.

Oguchi believes that the mild form of acute trachoma, or that healing without any scar tissue, is identical with the inclusion conjunctivitis and the bath conjunctivitis. The etiologic importance of the Prowazek or inclusion bodies is not certain but probable, especially in inclusion conjunctivitis. The virus in a mild form increases in the genital tracts; when this gets into the eye of a newborn, it causes inclusion blennorrhea and in the eyes of adult bathers, it causes the swimming pool conjunctivitis. The inclusion bodies are very sensitive to warmth, insensitive to cold and medicines, particularly to silver nitrat. In the author's clinic at Majima, inclusion bodies cultured from the secretion of acute trachoma and those from blennorrhea of the newborn are very similarly constituted. However, such bodies might be morphologically similar but biologically quite different. Prowazek's bodies also occur in epitheliosis desquamativa of the South Seas, in conjunctivitis samoensis and in various allied granular form of conjunctivitis occurring in the tropics as in frambesia with syphilis.

H. G. L.

**Shimkin, N. Endonasal Treatment in Acute Dacryocystitis.** *Klin. M. f. Augenh.*, 1925, Sept.-Oct., 75, p. 429.

Some cases of acute exacerbation of chronic dacryocystitis are the results of complete obstruction of the lower opening of the nasolacrimal canal thru acute rhinitis, swelling of the lower turbinates, etc. The application of 5% cocain and adrenalin frequently suffices to open the lower end by shrinkage and relieves the condition. It ought to be applied before other measures. Four illustrative clinical histories are reported.

C. Z.

**Reitsch, W. Methods of Treatment with Probes.** *Klin. M. f. Augenh.*, 1925, Sept.-Oct., 75, p. 419, Ill.

The failure in treating the lacrimal disturbances with probes is mainly due

to insufficient after treatment. This must aim to remove all blood coagulation which is apt to form even after most careful introduction of probes. Reitsch, therefore, after probing, irrigates the duct repeatedly with salt solutions. If, after three treatments, the canal closes again, the treatment with probes will be of no avail.

C. Z.

**Spring, J. F. Episcleritis and Tuberculin Treatment.** *Med. Jour. of Australia*, 1926, May 8, p. 520.

An apparently healthy young woman with episcleritis, in spite of treatment was no better. Her own capable physician reported no evidence of any tubercular lesion but tuberculin was given starting with .00001 mg. T. R. One week after there was a definite improvement in the eye. The second injection of the same size was also followed by some improvement, but after a third similar injection, the eye flared up and was just as bad as it was when she commenced treatment.

Continuing the weekly injections, .000005 mg. T. R. was given next time. After three more injections, the eye tho improved, seemed to come to a standstill. The injection of .00001 mg. was resumed only to get a rather more vigorous reaction than desired. The next week .000008 mg. was given. This gave the slightest reaction, which had subsided in three days, leaving the eye almost well. Three more such injections completed the cure. The eye looked well and treatment was stopped. It remained well without any further treatment after six months.

E. J.

**di Marzio. Vaccine Therapy in Gonorrheal Ophthalmia of the Adult.** *Saggi di Oftalmologia*, 1924, p. 3.

The author reviews the theoretic considerations with regard to serum and vaccine therapy, summarizing the results of previous authors who have used vaccine therapy in this condition, most of whom reported a relatively small number of cases, none over ten. di Marzio here reports the results of a careful observation of one hundred

cases seen during the war. He first treated five cases with antigonococcal serum without observing any beneficial effects. In four of these cases the cornea was lost. He then used the polyvalent antigonococcal vaccine of the Milanese Institute of Serology. This was used in the series of one hundred cases. In the first 21 cases, the usual small doses of five to thirty million organisms were used and no great benefit was observed from this treatment, there being 17.6% of corneal lesions which occurred during treatment. In the remaining 79 cases, two doses of one hundred million organisms were given at three day intervals followed by two doses of two hundred million organisms as a general routine, this being varied slightly in different cases. In only six per cent of those cases did corneal lesions occur after the treatment had been begun. Twenty-five cases already had corneal lesions at their first appearance, most of these being quite severe, many having already perforated. In five of these cases a cure was obtained. Of the whole series, 67% healed without any corneal complications. In the 80 cases in which large doses of bacteria were used, a marked effect was seen on the inflammatory signs of the disease. There was a rapid decrease in the swelling of lids and conjunctiva. The secretion diminished rapidly after the first three injections and after ten to fourteen days had usually disappeared entirely. Smears were examined in all cases before and after treatment and usually also during the treatment. Those examined during the treatment showed the organisms in various stages of degeneration within the leucocytes while those taken after the treatment showed an absence of organisms. Silver was used in the first 20 cases but was given up entirely in most of the last 80 cases which only received mild astringents, irrigations with a preparation of colloidal silver to clear up the subacute conjunctivitis which persisted for a short time after the injections were finished. An interesting observation was made of the

effect of the vaccine treatment on the complement fixation reaction, in 16 cases in which this was carried out. Before treatment was begun the reaction was positive in seven cases, being four plus in only two of these. After treatment all gave a positive reaction and in 9 this was four plus, and in 6 three plus. The question of whether the therapeutic effect is due to an increase in the opsonic index of the blood or to an increase in other specific bacterial antibodies is considered. From the evidence at hand, it is uncertain which of these is the most important, but the author's series at least affords evidence that the specific antibodies are increased by a course of vaccine therapy. Urethritis was present in only six cases and did not respond to the vaccine therapy as well as the ocular condition did. The unusually low incidence of urethritis is due to the fact that most of the cases were probably the result of self inoculation (Military Service). Fairly severe general reactions occurred in a number of cases, especially among the last eight, but these were in no case so severe as to be alarming (Bibliography).

S. R. G.

**Jaensch, P. A. Thrombosis of the Cavernous Sinuses.** *Klin. M. f. Augenh.*, 1925, Sept.-Oct. Vol. 75, p. 375, ill.

Within three days, exophthalmos, enormous chemosis with great limitation of motility developed in both eyes of a robust man, aged 47. Later extensive retinal hemorrhages occurred and thrombosis of the central retinal vein. After excluding all other possibilities, an atypical thrombosis of both cavernous sinuses due to a fracture of the skull six months previously, was assumed.

C. Z.

**Wick, W. Transplantation of Fascia Lata in Paralytic Lagophthalmos.** *Klin. M. f. Augenh.*, 1925, Sept.-Oct., 75, p. 432, Ill.

Small incisions are made at the external and internal angles of the eye and the skin of the lid between them is undermined. A strip of fascia lata, 0.5 cm. wide and 8 cm. long, is pulled

thru the skin canal and fastened at the periosteum and the internal palpebral ligament and the wounds of the skin sewed. This gave an excellent result in a man, aged 80, who suffered from paralysis of the facial nerve after a mastoid operation.

C. Z.

**Lischkoff, M. A. Simulated Blindness and Its Detection.** *Jour. Florida Med. Assoc.*, v. 3, pp.204-06.

On account of the large number of injured eyes following accidents, and the hope of compensation therefrom, it is not a rare occurrence to meet with one who simulates.

Only seldom is total blindness simulated, on account of the difficulty in carrying out the design and the relative ease with which it is detected; so that partial amblyopia is the common form we encounter. This may be the feigning of total or partial blindness in one eye, or exaggerated loss of vision in both. Quite similar are the symptoms of hysteria, which must always be excluded.

When there is lack of agreement between the results of our functional testing and the objective examination, we should immediately become suspicious, yet observe carefully, so that the patient will not be aware that he is even under suspicion.

If amaurosis is claimed the first thing we look for is the pupillary reaction, which, if present, should make us gravely suspicious. But the feigner might have dropped atropin in the eyes to offset any suspicion, so that the facial expressions are important and should be carefully watched when the light is thrown upon the eye.

The patient is made to look with the blind eye at his own hand, which he holds in front of him. A blind man will not hesitate to do this since he knows the position of his hand by the sense of feeling. A malingerer will purposely look in the wrong direction. A pencil held between the sound eye and a book will conceal certain words if the other eye is blind. But if the second eye is good, it does not interfere with the reading as he unconsciously reads with the other eye. A prism of 4 degrees apex up over the apparently



blind eye will produce vertical diplopia and the patient cannot read with it; with this over the eye he is told to walk upstairs. This he cannot do on account of the diplopia. Of course, if the eye is amblyopic, it will have no effect.

By putting a 6.0 D. sph. over the good eye and having the patient read, move a paper slowly away and then cover up the bad eye, he being unable to read with a 6.0 Sph. shows he is reading with the bad eye. A 5.0 cylinder axis vertical is held over one eye and the same cylinder axis horizontal over the other, then mark a number of parallel lines horizontal and a number of them vertical. He can count one set of lines with one eye and the other with the other eye. Seeing with both eyes would confuse him. Put a strong cylinder over the bad eye and nothing over the good eye, and turn the cylinder. If the patient is made to look at a square it will change its shape.

A test that I employ most is to put on a prism of 4, 5, or 6 degrees base up or down, and plain glass over the other eye, then have the patient look at a vertical line with a dot on it and he will see two dots one below the other. With one eye blind he could only see one dot. I then walk him in the dark room and ask, "How are the lights situated?" When he tells me, he must see with two eyes, for if one eye is blind he can only see one light.

A plus 6.0 cylinder axis horizontal over one eye and a vertical over the other will give an elongated square if one eye is blind.

If a box be fitted with two mirrors at an angle of 120 degrees meeting at the center, with two holes opposite the mirrors to look thru the box and an object in front of each mirror, he will be confused when told to look in the box, because he will see with each eye the object opposite the other eye. Now a curtain can be added to it to cut off one eye at a time to make the test more certain.

Color tests often deceive the malingerer. Place a red glass over one eye and a green one over the other, then have a test card with red and green

letters; if he can read it correctly, he does with both eyes, as thru the red glass red letters alone can be seen, green rays are not transmitted thru red glass. Yellow as well as red letters are defaced by red so that these three colors may be used.

A light blue glass over one eye and a dark blue one over the good one will make everything look blue, and when he is told to read, he must do so with the eye supposed to be bad.

It is well to record accurately the subjective examination because a second examination will probably not give the same results. One should never forget that it is of most importance to watch the eyes of the patient, so that he cannot close one or the other quickly enough to catch on to the correct reply. I have seen patients who could read 20/200 with the bad eye, and on being brought ten feet closer to the test card, say he could see no more, when we know he must see more. Only recently I examined a man whose eyes were injured in an accident. He could read 20/100 with the bad eye, and when I brought him ten feet closer to the card, he said he could see no more. I then changed test cards and he was afraid to admit what he could see. I then had him look thru a mirror ten feet in front of him at the letters he had just read, and he, not knowing that he should not see as well, read exactly the same as before and made the same mistakes as before.

We should always take the field of vision and repeat it to see if it corresponds. Then take it with one eye bandaged, and the second time with both eyes uncovered. Should the bad eye not see, it will naturally not interfere with the first field taken.

A reading chart with all the letters on the line not the same size will also be of service.

It is the cases of exaggerated feebleness of sight that tax our observation greatest, and so here especially we must depend on repeated examinations, each of which should correspond, and most important the malingerer should never know that he is under suspicion.

E. J.

## Current Literature

These are the titles of papers bearing on ophthalmology. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in *heavy-faced type*. The abbreviations means: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper.

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